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Carrington Kung

Despite the imminence of the holiday season and the exodus from Washington of oil men bound for the American Petroleum Institute's convention at Chicago, Nov. 12, oil continues to make news in the Nation's Capital.

The O'Mahoney Petroleum Investigating Committee heard testimony from the oil, coal and railroad industries on problems of plant disposal, transportation, and disposition of the government-built "Little Inch" and "Big Inch" pipelines.

The Congressional Record aired the views of the Independent Petroleum Association of Texas and other Texas rebels against the recently approved Anglo-American oil treaty, which awaits Senate ratification.

The tidelands quitclaim legislation seemed slated for hearings before the Senate Judiciary Committee either late in January or early in February, but the issue will come up in the U. S. Supreme Court next month when the State of California files its answer on the suit brought by the government to establish title to the lands in the United States.

Disposition of government-owned refinery facilities attracted perhaps the most interest at the O'Mahoney hearings, with several members of a special industry committee expressing divergent views on the manner in which the plants would be sold to the oil industry. M. H. Robineau, vice-president of Frontier Refining Co., Cheyenne, Wyo., and Paul G. Blazer, chairman of the board of the Ashland (Ky.) Oil & Refining Co, particularly disagreed with the recommendations of a subcommittee headed by Hines H. Baker, vice-president of Humble Oil Co.

Baker's view was that the war-built facilities should be sold upon an evaluation of pre-war costs while Blazer and Robineau held that pre-war costs had nothing to do with the matter. Baker also was against any credit extension by the Government while the other two men argued that capacity to pay should be taken into consideration and an extension of credit made possible.

On the subject of the famous "Inch" pipelines, the general consensus was that the lines should either be removed from use by Congressional action and held in reserve as a military asset, or used for the transportation of natural gas, from East Texas to the New York area. Opposition naturally arose from the coal and railroad representatives who reasoned that bringing gas to the east would lessen the demand for coal and thereby reduce railroad tonnage.

While no concrete offer has yet been made for the lines, for use as gas carriers, at least two groups are said to be ready to bid. A Washington attorney, D. Heywood Hardy, appeared for a group of Dallas, Tex., men headed by Harold Byrd, declaring his clients were ready to spend $20,000,000 for the construction and installation of booster stations on the lines.

A New York consulting gas engineer, Charles H. Smith, told the committee a group of New Yorkers, headed by Dr. James B. Bonbright, chairman of the New York State Power Commission, was interested in purchasing the lines. Texas oil and gas men are supposed to have $100,000,000 with which to put through the deal, but the financial backing of the New York syndicate has not been made known.

A constructive policy for disposal of surplus tankers was urged at the hearings by the industry, with private enterprise encouraged and American citizens favored as customers. Some differences of opinion have arisen in the industry on the price at which surplus tankers should be sold, whether the government should charter tankers postwar and whether any part of the surplus remaining after all demands are met should be scrapped, the committee was informed.

The problem of scrapping overage vessels and tankers unfit for service "because of severe war abuse" also was discussed. Maintenance of any surplus new-type vessels in a national defense reserve was advocated by T. E. Buchanan,

(Continued on Page 29)

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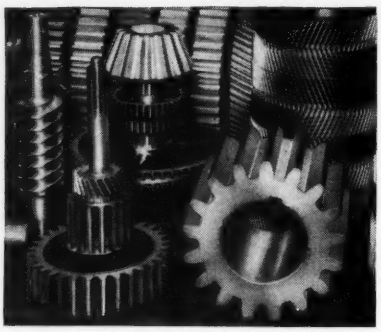

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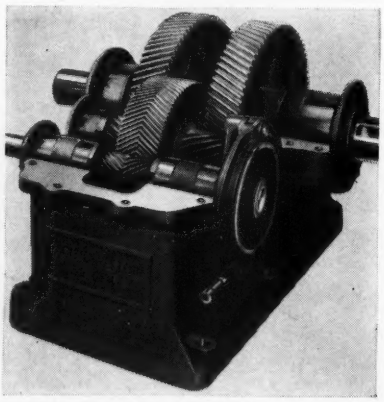

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Fall Meeting Pacific Section of A. A. P. G.

The Pacific Section of the American Association of Petroleum Geologists held its twenty-second annual Fall meeting on Thursday and Friday, November 8 and 9 at the Ambassador Hotel in Los Angeles.

Four hundred persons gathered to hear talks and discussions on a wide variety of subjects of importance to the geologist in the search for oil. In addition to geological talks on areas within the United States as well as foreign countries, there was also discussions on topics of considerable interest to all members of the oil industry.

Fourteen talks were on schedule for the two day program. Among the speakers on the program for the opening session was Dr. Chester R. Longwell, Professor of Geology at Yale University and American Association of Petroleum Geologists Distinguished Lecturer. Dr. Longwell spoke on "Stratigraphic and Structural Problems of Southern Nevada and Western Arizona." In addition, Frank S. Parker, Signal Oil & Gas Co., reviewed results of California exploration during the war period.

The Thursday afternoon session was taken up mostly with discussions on the geology of territories outside the United States. Talks covering areas in South America and Alaska were presented at this session.

On Thursday evening the Society of Economic Paleontologists and Mineralogists held a dinner meeting at the Clark Hotel in Los Angeles, at which Glenn C. Ferguson, Bakersfield consulting paleontologist, discussed the "Paleocene" beds of the San Joaquin Valley.

The Friday morning session was highlighted by a talk by Dr. Bailey Willis, Professor Emeritus of geology, Stanford University. Dr. Willis' subject was "Terrestrial Dynamics."

The Friday afternoon program was brought to a close by a talk entitled "The Most Powerful Man in the World" by Mortimer Kline, Los Angeles attorney. Mr. Kline traced the history of the oil industry during the period of conversion from coal to oil and showed how one man, Sir Henri Deterding of the Royal Dutch Shell was able, through tremendous energy and foresight to shape the destiny of an oil empire.

The newly elected officers for the Pacific Section, American Association of Petroleum Geologists for 1946 were:

President E. R. Atwill, Union Oil Co.; Vice President, Vincent Vandiver, Seaboard Oil Corp.; Secretary-treasurer, Ashley S. Holston, Tidewater Assoc. Oil Co.

Abstracts of the papers follow :

Recent Investigations by the Geological Survey of Alaska's Petroleum Possibilities

By JOHN C. REED

(Published by permission of the Director, U.S. Department of the Interior, Geological Survey)

Because of the acute national situation in regard to oil during the war, the Geological Survey initiated detailed examinations in the summer season of 1944 in a number of the areas that, on the basis of considerable reconnaissance work over nearly half a century, were considered most likely to contain petroleum. In 1944 these studies were undertaken in five widely separated localities and similar investigations were continued in 1945. From them and the earlier more general examinations, three large areas are indicated as of most immediate significance. These may be designated as the Gulf of Alaska area, the Alaska Peninsula-Cook Inlet area, and northern Alaska. In each of these regions are a number of structures or other indications regarded as favorable for the possible accumulation of petroleum and that therefore seem worthy of intensive investigation.

In the Gulf of Alaska area the oil possibilities are confined to rocks of Tertiary age. Farther west in the Alaska Peninsula-Cook Inlet region, Jurassic rocks overlie a Triassic limestone that is presumed to be a possible oil source. In northern Alaska, the Navy Department is exploring the oil possibilities of Naval Petroleum Reserve No. 4 that lies in an extensive tract underlain for the most part by gently folded Cretaceous rocks. The Geological Survey is playing a part in the exploration program of the Navy Department.

Much additional information must be gathered before it is possible to estimate in quantitative terms the potential petroleum resources of Alaska. The determination of the value of these latent resources presents a challenge and the prospective returns well warrant tackling the job of determining the pertinent facts.

Terrestrial Dynamics

A Lecture by
BAILEY WILLIS, M.E., C.E., Ph.D.
Emeritus Professor of Geology,
Stanford University

The progress in physics and geology requires a revision of geologic theories. We now know that the earth has a molten core, 4,000 miles in diameter, which is covered by a shell 1,800 miles thick, that is solid and mostly crystalline. It is called

the mantle. And there is an outer crust from 20 to 30 miles thick. The effective forces operating throughout this structure are gravity or load pressure, heat, and atomic attractions and repulsions. The heat may be attributed to compression and radioactive disintegration of atoms, but probably not to survival from an originally molten globe. In this hypothesis it is regarded as mainly due to radioactive processes.

It is reasonable to assume that radioactive minerals exist in the core and are its principle source of heat. Since the heat cannot escape the core must be heating up and growing at the expense of the mantle. The earth is growing hotter, not cooling.

The boiling core emits gases and superheated liquids that bore into the mantle and form bubbles of magna. The bubbles rise by virtue of their bouyancy and boring activity. Their mineral composition changes by assimilation and adjustment of mineral species to environment. Starting from the core as nickel iron and accessories they emerge in the crust as basalt and granite.

The mechanics of the pressure in and around a bubble of magna give it the shape of a pear, biggest at the top. On approaching the surface this effect develops the tack-shaped batholith. The cover over such a batholith is liable to uplift, indicated at the surface by elevated plateaus and broad domes or elongated swells, and to metamorphism, which may produce lateral pressures. The unbalanced load of an elevated mass also creates lateral pressure. Under certain circumstances the effect of lateral stress and strain in combination with magmatic heat may produce extensive horizontal intrusions some 20 miles below the surface. Such a one is thought to have been the mass under the Appalachian geosyncline during the Paleozoic era. To that moble foundation we may attribute the sinking of the sediments and by a logical development of load stresses in combination with magmatic pressures we may explain the folding of the Appalachians, the outthrust of the Himalayas, and similar displacements.

Bubbles of igneous rock have risen to the surface at intervals during the last 2 billion years. They consist of two principle kinds, basalt and granite. They differ in fluidity or viscosity. The basalt reaches the surface and spreads out, forming such features as ocean beds and plateaus. The granite lifts the surface without breaking through, causes lateral stresses, and becomes the core of a mountain range. The possible mechanical effects are varied. We cannot reason from one orogeny to another, without due consideration of the facts of unlike histories. The Appalachian mechanics will not explain the Rockies, nor the Basin ranges, nor the Alps. Each orogeny is a problem in itself. But they all are to be explained through a study of the reactions of the forces of gravity, magmatic intrusion, and atomic activity.

The prolonged sequence of intrusions of the surface by magmatic bubbles is regarded as the source of the crust. The process is not finished nor ever can be, since radioactive disintegration continues to heat the core. We may infer that the thinning mantle will ultimately disappear and the planet will become a star.

Stratigraphic Section East of Bogota, Colombia, South America

By THOMAS CLEMENTS
University of Southern California, Los Angeles, California

A geologic traverse was made by the author in 1939 along the road from Bogota to Villavicencio, a distance of 122 kilometers. The purpose was to attempt to correlate the rocks of the little-known east side of the Cordillera Oreintal with the better-known formations of the Magdalena Valley on the west side of the mountains.

The rocks outcropping along the traverse are sedimentary and metamorphic, and range in age from possible Cambrian to Pleistocene; only the Cretaceous rocks yielded abundant fossils. Igneous rocks reported to occur both to the north and to the south of the line of traverse were not encountered in this particular section, although the basal conglomerate of the Cretaceous contains fragments of granite.

The formations observed along the road, with their respective ages, are the following: Quetame, Cambrian (?); Vinculo, Devonian (?); Pipiral, Carboniferous (?); Colorado, Permian (?); La Argentina, Cretaceous (?); Cáqueza, Cretaceous (Lower Valanginian); Villeta, Cretaceous (Upper Valanginian, Hautervian, Barremian, and Aptian); Guadalupe, Cretaceous (Middle Albian and Cenomanian); Buena Vista, Tertiary (?); Guaduas, Tertiary, Eocene (?); terraces, Pleistocene.

The principal structural features are the Bogotá fault, an overthrust to the west; the Cáquega fault, an overthrust to the east; the San Martín fault, normal, with the westerly block downthrown; the Argentina fault, normal, with the easterly block downthrown; and the Cientoquince fault, an overthrust to the east. In addition, the Guadalupe formation is folded into a large, gentle syncline, and all the rocks show a very great number of small folds.

The First Oligocene Mammalian Fauna from Northern South America

R. A. STIRTON

Fossil vertebrate remains were found on the NW limb of the San

Jose anticline south of the Rio Tetuán and approximately ten kilometers NE of Chaparral, Tolima, in the upper Magdalena region, Colombia. They were discovered in a thin lense of bone breccia within a blue gray clay member (La Cira zone) of the Gualanday (= Brazalosa) series.

The type La Cira from the middle Magdalena was called Upper Oligocene by A. A. Olsson as based on a fresh water invertebrate fauna. The mammal remains from Chaparrel indicate a relationship close to the Deseado Lower Oligocene of Argentina.

Tentative faunal list: Chelonian, crocodilian, ground-sloth, toxodont (? **Proadinotherium),** litoptern (? **Prothesodon),** astrapothere (near **Uruguaytherium),** and condylarth.

Notes on Rocky Mountain Thrust Faults

E. C. H. LAMMERS
Standard Oil Co.

The low-angle thrust faults of the central Rocky Mountains are of two types. The faults along the Idaho-Wyoming border were formed when the exceptionally thick Paleozoic and Mesozoic strata of the Cordilleran geosyncline were intensely compressed during the Laramide revolution. Movement on these faults, which do not involve the crystalline rocks of the basement complex, is believed to have been dissipated at depth by shearing along bedding planes. The name "geosynclinal" trust fault is proposed for faults of this type.

In contrast, the low-angle thrust faults of central Wyoming and southern Montana were produced by the further compression of large faulted blocks previously uplifted during an earlier stage of the Laramide revolution. The crystalline cores of these uplifts contributed large quantities of detritus to the Paleocene strata forming the footwall blocks of some of the thrusts. A study of the structures of the basement complex indicates that the present uplifts occupy the sites of pre-Cambrian mountain ranges. Hence, this group of thrust faults borders areas that have been recurrently structurally positive throughout geologic time. The name "geanticlinal" thrust fault is proposed for thrust faults of this type.

J. S. Hollister gave a paper entitled "Geology of Tierra del Fuego, Southern Chile" in which a brief resume of the stratigraphy and structure of that part of Chile was presented. The presence of a Cretaceous-Tertiary basin, 20,000 feet or more deep, east of the main Cordillera, was pointed out and the suggestion made that a land mass lay to the west as well as one on the east of this basin during the late Mesozoic and Tertiary time.

Kodachrome slides were then shown of the canals as well as of typical scenes to be found in that part of southern Patagonia.

Results of California Exploration During the War Period

FRANK S. PARKER
Signal Oil & Gas Co.

The paper continues the work Roy Barnes published in the A.A.P.G. Bulletin of October, 1940, on through the War Period with emphasis on discoveries of the first nine months of 1945. The trends of geophysical activity, geological employment in exploration, and the number of A.A.P.G. members in California are shown and compared with the price curve. A pronounced increase in A.A.P.G. membership is found with only a slight increase in employment in the seventeen companies considered. It is thought the employment trend is not representative as many of the smaller companies not considered have added to their staffs. The seismograph activity has fluctuated seasonally but has averaged a level trend.

Wildcat drilling as shown by the dry hole curve has increased and broken previous records both in 1943 and 1944. The lesser increase in number of currently active wildcats is ascribed to incerased efficiency in shortening rigging up and shut down periods due to greater demand for rigs and crews.

A clear correlation is shown between the number of wildcats drilled and the number of discoveries made. The less obvious correlation between geological employment and discoveries may be due to the lapse of time between the working out of a play and the drilling of it, in some cases five or ten years. The increased demand and price of dry gas is reflected in the increasing number of gas field discoveries.

The correlation of reserves, production, and new reserves by discovery is shown. The new reserves discovered have failed to keep pace with the production. The production which reached a new high of 311 million barrels in 1944 and possibly will reach 315 million in 1945, has been maintained by increased development drilling and the discovery of new pools and extensions. By the end of the war the California reserves had declined only 185 million barrels, from 3533 million in 1939 to 3348 million in January of 1945. The effect of Order M-68 on development drilling is well marked by a slump while practically no effect is visible on wildcat drilling. As was intended, that order provided materials to keep up the pace of exploration at the expense of development drilling. The prompt recovery of development activity by the fall of 1942 and its rapid increase from then through the war is illustrated by the curve.

The amount of oil found by wildcatting alone, that is, the amount of oil in the discovery pool only of

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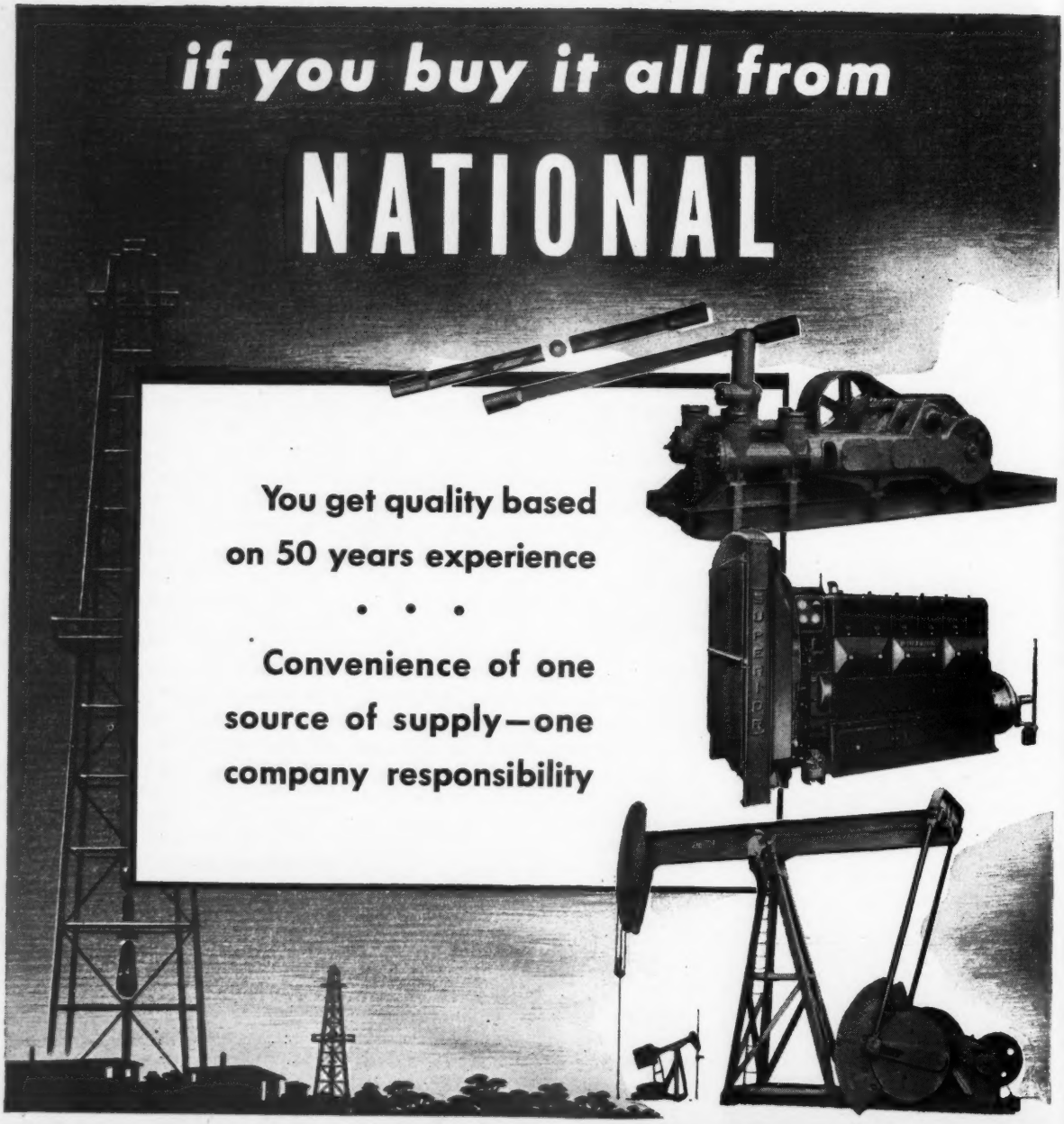

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the fields is compared with the total ultimate by years. The curve shows that approximately three-eighths of the oil has been in pools discovered by later exploratory drilling.

Also, it is seen that the discoveries in California have come in steps of half billion or more size additions to reserves at intervals of eight to ten years which are timed by advances in geologic exploration, drilling technique, and seismic exploration. The present year should be the period for another advance in discoveries according to the chart, but so far has not been distinguished from the last six or seven years in volume of oil found. The writer estimates roughly 25 million barrels of oil as the reserves of the new fields. With the data so far in hand no estimate of the new gas fields or of the new pools and extensions can be given.

The various exploration methods or combinations of them leading to the drilling of the dry holes and discoveries are compared graphically. The chart showed 20 wildcats to be successful out of a total of 202 drilled. Of these only sixteen will eventually be regarded as having found fields rather than extensions, and five of these were of dubious commercial value. The greatest footage and number of wells were drilled on subsurface work with both seismic and surface work less and about equal. Other methods and combinations had much less footage. The overall wildcat success percentage was 10.2%. New pool tests were 31% successful and outposts 42% successful. It appears that at the present rate 1945 will end with somewhat less wildcat footage but with a greater number of wells drilled. Other types of exploratory wells will exceed substantially 1944 both in footage and number.

Late Palezoic and Early Mesozoic Stratigraphy of the Uinta Mountains, Utah

By HORACE D. THOMAS and MAX L. KRUEGER

At the western end of the Uinta Mountains, Triassic rocks rest unconformably on the Permian Park City formation. From the base upward the Triassic rocks are (1) red Woodside shale, (2) marine Thaynes limestone, (3) Ankareh redbeds, and (4) a conglomerate and overlying sandstones and shales. The conglomerate, sandstones and shales were classed as basal Nugget sandstone, Jurassic, by Boutwell (1912), but were excluded from the Nugget (Navajo) by Heaton (1939), leaving them without a name. The Thaynes thins and tongues out eastward, and east of its edge the Woodside and the Ankareh cannot be differentiated.

At the eastern end of the mountains, Woodside redbeds rest on the Pennsylvanian Weber sandstone. The lower part of the Woodside is the time equivalent of the upper Park City (Phosphoria). The Woodside is cut by an unconformity above which lies a conglomerate. The conglomerate was questionably classed as the basal member of the Ankareh by Sears (1926). The upper part of the Ankareh (?) of Sears consists of varicolored shales and sandstones and is directly overlain by the massive Navajo sandstone.

The conglomerate and the overlying varicolored beds are readily recognized from one end of the range to the other and constitute an unnamed lithologic unit which lies unconformably above the type Ankareh and below the restricted Nugget at the western end of the mountains, and unconformably above the Woodside and below the Navajo at the eastern end of the range. This unit is here named the Stanaker formation and the basal conglomerate, or grit, is named the Gartra grit member of the Stanaker formation. They are of probably Upper Triassic age.

The Jurassic formations of the western Uinta Mountains, from base uyward are (1) Nugget sandstone, (2) Twin Creek limestone, (3) Preuss redbeds, (4) Stump sandstone, and (5) Morrison formation. Eastward along the mountains (1) the Nugget sandstone persists but is called Navajo to the east, (2) the Twin Creek limestone intertongues with the Carmel redbeds, (3) the Preuss redbeds grade into the cross-bedded Entrada sandstone, (4) the Stump sandstone grades into Curtis shales and limestones, and (5) the Morrison thins and becomes less conglomeratic. At the eastern end of the Uinta Mountains the Carmel redbeds thin out so that the Navajo is directly overlain by the Entrada, forming a single cross-bedded sandstone unit.

Vernon Tool Co., Ltd. announces the return of Lieutenant Commander Jack Blackburn, Naval Aviator. After four and a half years of active duty in the U. S. N. R., Jack again takes up his former position in the Engineering Department of the Company.

Captain Lee Grumbaugh, Petroleum Officer in the Corps of Engineers and recently released from active duty, has returned to Vernon Tool Co., Ltd., after service in England, France and Belgium with Communication Zone Hdqs., Petroleum Branch, U. S. Army. Grumbaugh represented Vernon Tool for more than four years prior to entering the service.

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Hydrocarbon Thermodynamics

By

WAYNE C. EDMISTER
Foster Wheeler Corporation
New York, N. Y.

INTRODUCTION

Practically all operations in hydrocarbon production, transportation, processing and consumption involve the conversion of energy from one form to another and, of course, some energy is always lost to the low-temperature heat sink, which may be the flue gas stack, the cooling water, the atmosphere, etc. It is obvious that thermodynamics is of paramount importance to technical men concerned with these operations.

The objective of this paper is to summarize the fundamental concepts of thermodynamics, to review some of the important contributions made in the application of thermodynamics to hydrocarbons, and to outline the plan or pattern followed in developing thermodynamic tools for hydrocarbons. This discussion starts with the fundamental equations and stops with the procedure for developing working charts and tables. The development of these equations and the preparation of complete working charts and tables are outside the scope of this paper.

Thermodynamics is a natural science, which deals with energy and the transformation of energy and with equilibrium and the equilibrium distribution of products. The language of thermodynamics is mathematics. A thorough knowledge of these mathematical methods is essential to an understanding of the development of the fundamental equations. Some familiarity with this mathematics is necessary to apply these equations to the preparation of charts and tables of thermodynamic properties.

For many years thermodynamics has been a very useful tool in the design and operation of steam boilers, engines and turbines, of internal combustion engines, or refrigeration units and of heating and ventilating equipment. Until recent years, however, very few efforts have been made to apply thermodynamics to chemical and chemical engineering problems which are encountered in the processing of petroleum hydrocarbons. There are two reasons why the development of this branch of thermodynamic has lagged behind the development of the so-called engineering thermodynamics; namely, (1) mechanical engineering problems have been more pressing due to the harnessing of the recently invented steam engine, turbine and internal combustion engine, and (2) chemical and chemical engineering thermodynamics is complicated by varying compositions of the working fluid, hydrocarbon mixtures and petroleum fractions offering some very troubling problems. Progress in the solution of these problems has been rapid during recent years so that new equipment can now be designed without too much "thermo" guessing. Many thermodynamic applications are necessary to keep process design technique apace with the development of new petroleum refining processes.

The author has been actively working in the field of Hydrocarbon Thermodynamics since college days at Oklahoma A. and M., where he wrote his first article on this subject in 1930. He was born in Oklahoma, where years of close association with the petroleum industry started him in hydrocarbon engineering. Graduate studies in this field have been pursued at Cornell University, The University of Chicago, and Illinois Institute of Technology.

Edmister's industrial experience includes: (1) design, construction and operation of gas-lift and natural gasoline plants, (2) refinery process development, design and operation at the Whiting refinery of Standard Oil of Indiana, (3) operation of government synthetic rubber plants with Rubber Reserve in Washington, and (4) process design of petroleum refining plants at Foster Wheeler Corporation in New York.

While in this Chicago area working for Indiana Standard, the author engaged in part-time teaching of advanced chemical engineering and thermodynamic subjects at Illinois Institute of Technology. During the past 15 years, the author has published numerous technical articles in scientific and trade journals.

Process design of hydrocarbon processing equipment involves: **heat balances, material balances, equilibrium,** and **rates of reaction or transfer.** Thermodynamics is of immeasurable value in making the heat balance and equilibrium calculations, which may be divided into the following five types of process applications of thermodynamics; namely, (1) **combustion,** including furnaces and regeneration cycles; (2) **heat balances** including vaporization, condensation, distillation and heats of reaction; (3) **power,** including pumping, condensation, steam and electric drives and flue gas turbines; (4) **phase equilibria** for ideal and non-ideal solutions; and (5) **chemical reaction equilibrium,** involving estimation of equilibrium conditions and yields for reactions.

In general, the same procedure is followed in each of the above groups of application. First, experimental data are obtained and correlated. Second, tabulations and charts are derived and thermodynamic properties are developed. Third, the correlated experimental and derived thermodynamic prop-

erties are applied to the problem.

The application of thermodynamics to physical process operations such as fluid flow, heat transmission, distillation, etc., involve changes in heat or work and phase equilibrium, for which fugacities, entropies and enthalpies for liquids and vapors, both pure and in mixture, are required. The application of thermodynamics to chemical reaction involves the use of free energies for the reactants and the products, for which heats of fusions, vaporization and formation as well as heat capacities are required.

A brief resumé of the fundamentals and the properties of hydrocarbons required in applying thermodynamics will be made before discussing some of the applications in more detail.

* * *

FUNDAMENTAL CONCEPTS AND EQUATIONS

The basis of all thermodynamic equations involved in hydrocarbon processing work are the three laws of thermodynamics which are as follows:

First Law — The first law is a statement of the conservation of energy which includes the various types of energy; namely, potential energy, kinetic energy and internal energy. Until relatively recent times the first two kinds of energy were all that was required in scientific work.

Potential and kinetic energies form the basis for mechanics, their sum being known as mechanic energy. Internal energy is very important in the study of thermodynamics. The first law of thermodynamics states that heat and mechanical work are interchangeable. Conservation of energy is used in developing equations for the flow of fluids but is not sufficient in itself for the development of equations for phase equilibra, enthalpy and entropy. For this the second law is required.

Second Law — The first law relates the conversion of energy in one form to another but throws no light on the availability of energy. This is taken care of by the second law of thermodynamics through a property called "entropy." In simple language the second law states that heat alone will not, of its own accord, flow uphill and entropy is defined as an index of the unavailability or degradation of energy. Entropy "per se" is very seldom used in applying thermodynamics to hydrocarbons but it enters into the development of practically all of the thermodynamic tools that are used so frequently. The first and second laws of thermodynamics (i.e. conservation and degradation of energy) together form the basis for most of the thermodynamics as applied to hydrocarbon processing.

Third Law — The third law pertains to the absolute entropy of substance stating that the entropy of all crystalline substances is zero at absolute zero temperature. Absolute entropy is used in the computation of free energy for reactants and products.

The fundamental concepts of thermodynamics are summarized in Table I, which is self-explanatory. Most of this discussion will be on

FUNDAMENTAL CONCEPTS OF THERMODYNAMICS

First Law - Conservation of Energy

$\Delta E = Q \pm W$; ΔE = Change in Internal Energy of System.

Q = Heat Absorbed by System.

W = Work Done by System = $\int P dV$ for Batch Process = $\int V dP$ for Flow Process

$H = E + PV$; Definition of Enthalpy

$\Delta H = \Delta E + \Delta(PV)$; $\Delta(PV) = \int P dV - \int V dP$ = Flow Work

Second Law - Degradation of Energy

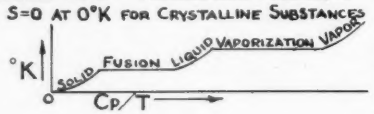
Entropy $S = Q/T$; or Infinitesmally, $dS = dQ/T$

$$\left(\frac{\partial S}{\partial T}\right)_V = \frac{C_V}{T} \quad ; \quad \left(\frac{\partial S}{\partial T}\right)_P = \frac{C_P}{T}$$

$$dS = \frac{C_P}{T} dT - \left(\frac{\partial V}{\partial T}\right)_P dP$$

Third Law - Absolute Entropy

$S = 0$ at $0°K$ for Crystalline Substances



Specific Heats

$$C_P = \left(\frac{\partial H}{\partial T}\right)_P \qquad C_V = \left(\frac{\partial E}{\partial T}\right)_V$$

$$\left(\frac{\partial C_P}{\partial P}\right)_T = -T\left(\frac{\partial^2 V}{\partial T^2}\right)_P ; \left(\frac{\partial C_V}{\partial V}\right)_T = T\left(\frac{\partial^2 P}{\partial T^2}\right)_V$$

$$C_P - C_V = -T\frac{\left(\partial V/\partial T\right)_P^2}{\left(\partial V/\partial P\right)_T}$$

Joule-Thomson Coefficient

$$\mu = \left(\frac{\partial T}{\partial P}\right)_H = \frac{T\left(\partial V/\partial T\right)_P - V}{C_P}$$

$$\mu C_P = -\left(\frac{\partial H}{\partial P}\right)_T = \left[T\left(\frac{\partial V}{\partial T}\right)_P - V\right]$$

Carnot Cycle

Power: $\frac{W}{Q_2} = \frac{T_2 - T_1}{T_2}$ Refrig: $\frac{W}{Q_1} = \frac{T_2 - T_1}{T_1}$

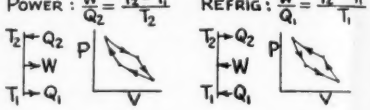


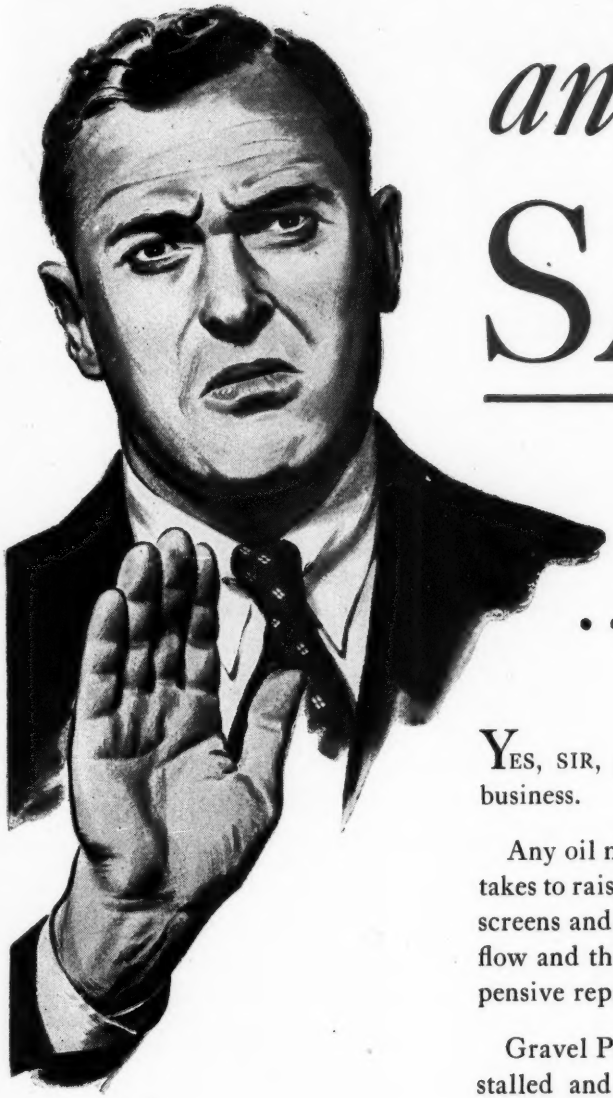
Table I
Fundamental Concepts of Thermodynamics (Reference 7)

THERMODYNAMIC POTENTIALS

Potential	Symbol	Mathematical Definitions	Indep't Variables	Differential Equations: Basic	Differential Equations: Transformed
Residual Work (Helmholtz Free Energy)	A	$A = F - PV$ $A = E - TS$	V,T	$dA = -PdV - SdT$	
Free Energy (Gibbs Free Energy)	F	$F = A + PV$ $F = H - TS$	P,T	$dF = +VdP - SdT$	
Internal Energy	E	$E = A + TS$ $E = H - PV$	V,T	$dE = -PdV + TdS$	$dE = C_V dT + \left[T\left(\frac{\partial P}{\partial T}\right)_V - P\right]dV$
Enthalpy	H	$H = A + TS + PV$ $H = F + TS$ $H = E + PV$	P,T	$dH = +VdP + TdS$	$dH = C_P dT + \left[V - T\left(\frac{\partial V}{\partial T}\right)_P\right]dP$

Table II
Thermodynamic Potentials (Reference 7)

"Pay $10.00 an ounce for SAND?



...not *ME!*"

YES, SIR, pumping sand is an expensive business.

Any oil man knows how little loose sand it takes to raise hob with pumps and equipment, screens and liners . . . not to mention reduced flow and the production time lost during expensive repairs, replacements and clean-outs.

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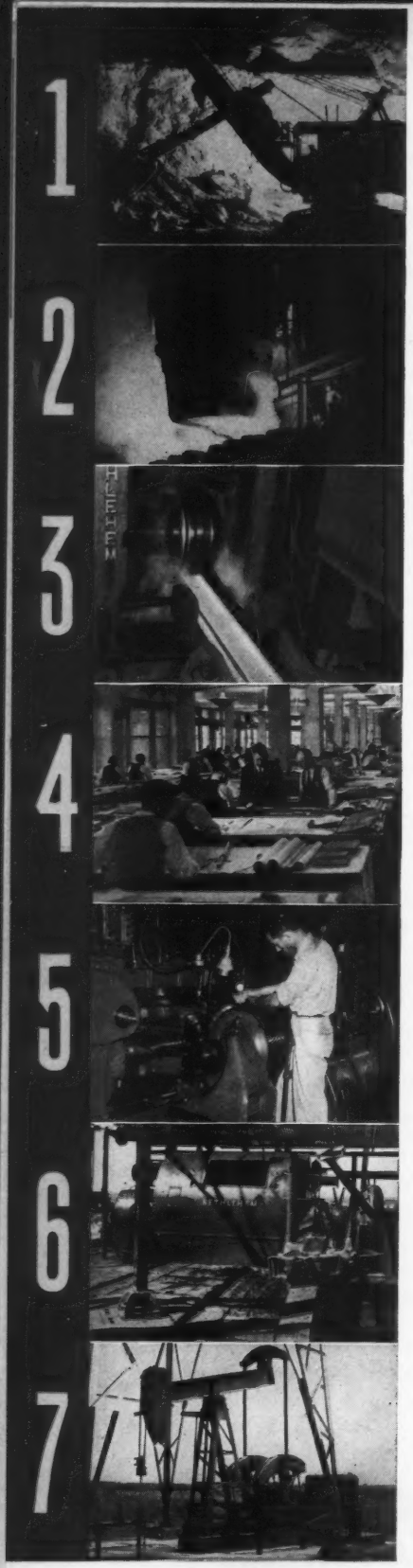

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application of thermodynamic equations and tools developed from the first and second laws.

The thermodynamic potentials used in applying these laws to hydrocarbon fluids are summarized in Table II, which gives the definition and equations of these potentials. These equations together with experimental data on the properties of hydrocarbons are used in computing enthalpies, entropies and fugacities for hydrocarbons and their mixtures. These computations may be made by means of generalized correlations of data using the generalized thermodynamic equations presented in Table III. It will be noted that these equations are expressed in terms of α_R the reduced volume residual. From the definition of the volume residual, i.e., difference between ideal gas law volume and actual volume, the equations shown in Table III follow from those given in Tables I and II. A correlation of α_R as a function T_R and P_R is required for the application of these equations.

GENERALIZED THERMODYNAMIC EQUATIONS

REDUCED EQUATION OF STATE

$$\frac{V}{\alpha_c} = \frac{RT_c}{P_c\alpha_c}\frac{T_r}{P_r} - \alpha_r$$

SPECIFIC HEATS

$$\left(\frac{\partial C_p}{\partial P_r}\right)_{T_r} = \frac{P_c\alpha_c}{T_c} T_r \left(\frac{\partial^2 \alpha_r}{\partial T_r^2}\right)_{P_r}$$

$$\frac{\Delta C_p}{K_2} = \int_0^{P_r} \left(\frac{\partial^2 \alpha_r}{\partial T_r^2}\right)_{P_r} dP_r$$

$$C_p - C_v = -T \frac{\left[\frac{R}{P} - \frac{\alpha_c}{T_c}\left(\frac{\partial \alpha_r}{\partial T_r}\right)_{P_r}\right]^2}{\left[\frac{RT}{P^2} + \frac{\alpha_c}{T_c}\left(\frac{\partial \alpha_r}{\partial P_r}\right)_{T_r}\right]}$$

FUGACITY

$$-\frac{RT_c}{P_c\alpha_c} = \ln \frac{f}{P} = \frac{1}{T_r}\int_0^{P_r} \alpha_r dP_r$$

ENTHALPY

$$dH = C_p dT - P_c\alpha_c\left[\alpha_r - T_r\left(\frac{\partial \alpha_r}{\partial T_r}\right)_{P_r}\right] dP_r$$

$$\frac{\Delta H}{K_3} = \int_0^{P_r}\left[\alpha_r - T_r\left(\frac{\partial \alpha_r}{\partial T_r}\right)_{P_r}\right] dP_r$$

ENTROPY

$$dS = \frac{C_p}{T} dT - \frac{R}{P} dP + \frac{P_c\alpha_c}{T_c}\left(\frac{\partial \alpha_r}{\partial T_r}\right)_{P_r} dP_r$$

$$S = C_p \ln T - R \ln P - \Delta S'$$

$$\frac{\Delta S'}{K_2} = \int_0^{P_r} \left(\frac{\partial \alpha_r}{\partial T_r}\right)_{P_r} dP_r$$

Table III
Generalized Thermodynamic Equations (Reference 6)

EXPERIMENTAL DATA REQUIRED

The experimental data required in computing thermodynamic properties of hydrocarbons include: (a) **volumetric** data, i. e., pressure-volume-temperature measurements, including vapor pressures and critical data; (b) **calorimetric** data, i.e., specific heats, latent heats of fusion and vaporization, heats of combustion and formation; (c) **thermal coefficients,** i.e., Joule-Thomson coefficients and the isothermal effect of pressure on enthalpy; and (d) **phase equilibria** data, i.e., the amounts and composition of the equilibrium liquid and vapor at various temperatures and pressures.

Considerable work has been done on determining these experimental properties of hydrocarbons. Considerably more must be done to improve these thermodynamic methods, particularly for hydrocarbon mixtures. It is important to realize that an imaginative application of the methods of thermodynamics to experimental data can make a few data go much further. Thermodynamic methods are used to correlate the experimental data and extend their range as well as interpolate and check the data for accuracy by means of correlations.

VAPOR PRESSURES AND PHASE DIAGRAM

Vapor pressure is a fundamental and useful property of single component hydrocarbon systems. Under some conditions vapor pressures of the components of a mixture may be used in computing phase equilibria. Even where fugacities are required for phase equilibria, vapor pressures are involved, as will be shown later.

The most widely accepted method of correlating vapor pressures is the Cox Chart, where the log of vapor pressure is plotted against the reciprocal of absolute temperature plus a constant. Hydrocarbon vapor pressures are straight lines on these scales. Figure 1 is a vapor pressure nomegraph, using the Cox scales, with fugacities shown for purpose of comparison. More will be said about fugacities later.

For a multicomponent hydrocarbon mixture, the pressure vs. temperature plot consists of two rather than one line. See Figure 2 for a comparison of the P-T plots for a single component and a mixture. The boiling point or saturated liquid and the dew point or saturated vapor lines join at the critical point, forming a phase border curve. The phase border curve shown in Figure 2 for a hydrocarbon mixture is of interest in several respects. In addition to showing the percent vapor lines, it shows the pseudo critical concept and can be used to explain the phenomenon of retrograde condensation. These items will be discussed further below.

When the lines of constant percent vaporized, including the bubble and dew point lines, are plotted with the logarithm of the absolute pressure and the reciprocal of the absolute temperature as coordinates, the result is a phase diagram with straight lines of constant percent vaporized the extrapolations of which intersect at a "focal point," as illustrated by the phase diagram for a naphtha-kerosene blend shown on Figure 3. In addition to the focal point, the critical point is indicated. A point on the border curve, not indicated but of interest, is the "cricondentherm" or point of maximum temperature. On the phase diagram shown in Figure 3 the lines of constant percent vaporized converge at the critical point.

The phase diagram can also be plotted in nomegraphic form, using the logarithm of the pres-

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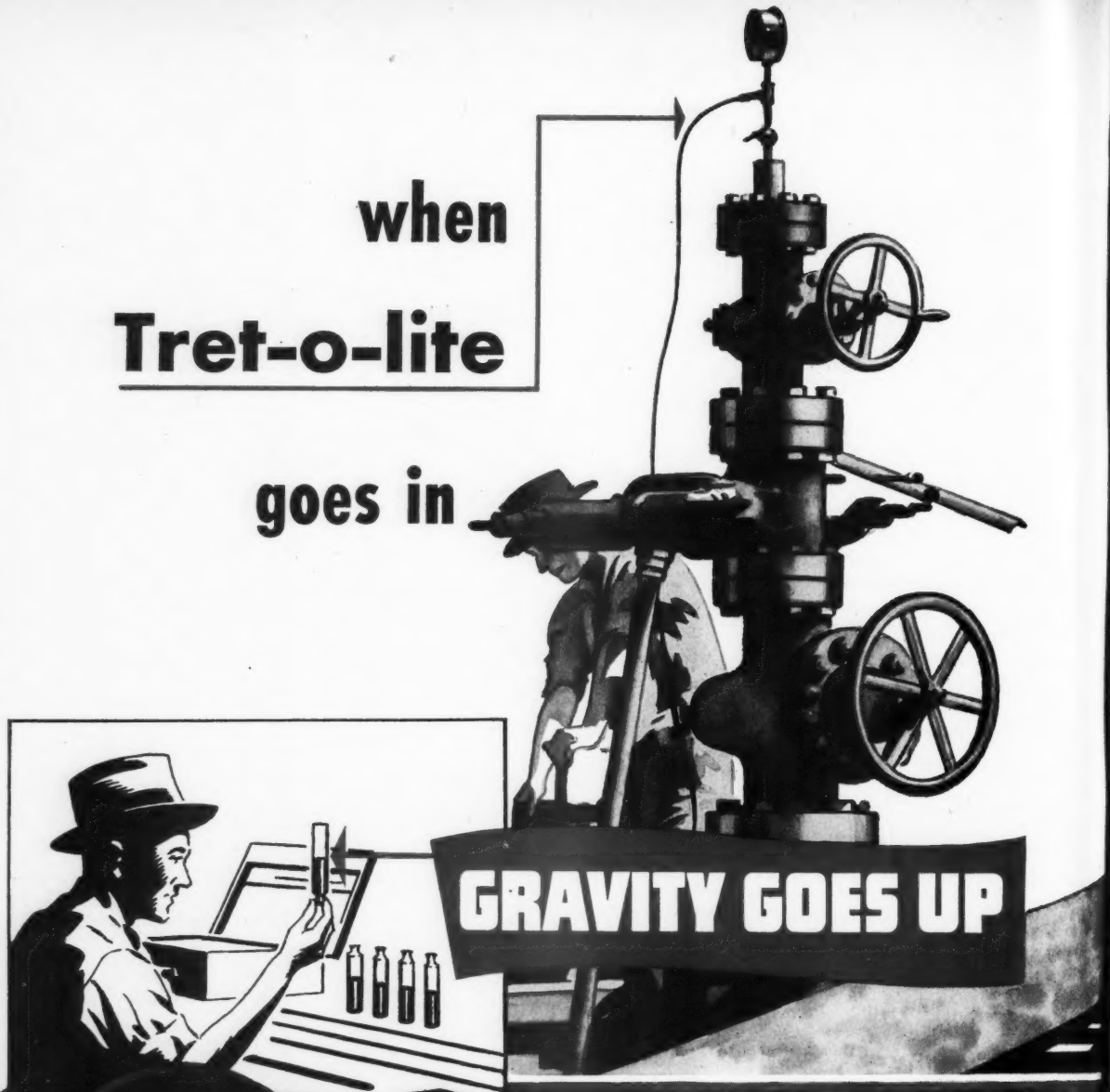

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sure and the reciprocal of the absolute temperature as the scales. Such a phase diagram plot which is shown in Figure 4, is possible because the constant quality lines are straight and all intersect at a common focal point in Figure 3. The advantage of the alignment method is that several solutions may be plotted on the same plot. The disadvantage is that the critical point region is not easily shown, making it almost impossible to make retrograde estimations at the dome of the border curve. The phase diagram of hydrocarbon mixtures may be constructed by component phase equilibria, calculations or by empirical correlations based on experimental data. In either of these methods the critical and the focal points are important. The focal point is a function of the critical point and the boiling range of the mixture.

CRITICAL POINTS AND RETROGRADE CONDENSATION

For every fluid, whether pure or a mixture, there is a temperature and pressure where the liquid and vapor phases become continuously identical. This point, which is called the "critical point", is the highest point on the vapor pressure curve of a pure component. The critical point is on the top dome of the border curve of a mixture. Above this point it is impossible to have vapor and liquid in equilibrium. For a mixture, the critical point may be at or near the point of maximum temperature, the point of maximum pressure, or in between these points on the phase curves. The location of the critical point on the border curve of a mixture determines the type of retrograde phenomena occurring.

In the retrograde zone, which is the dome of the border curve between the "critical" and the "cricondentherm" points, it is possible to have partial condensation on isothermal expansion (or isobaric heating) and partial vaporization on isothermal compression (or isobaric cooling).

The word retrograde implies a reversal and it is used to differentiate between a simple change in

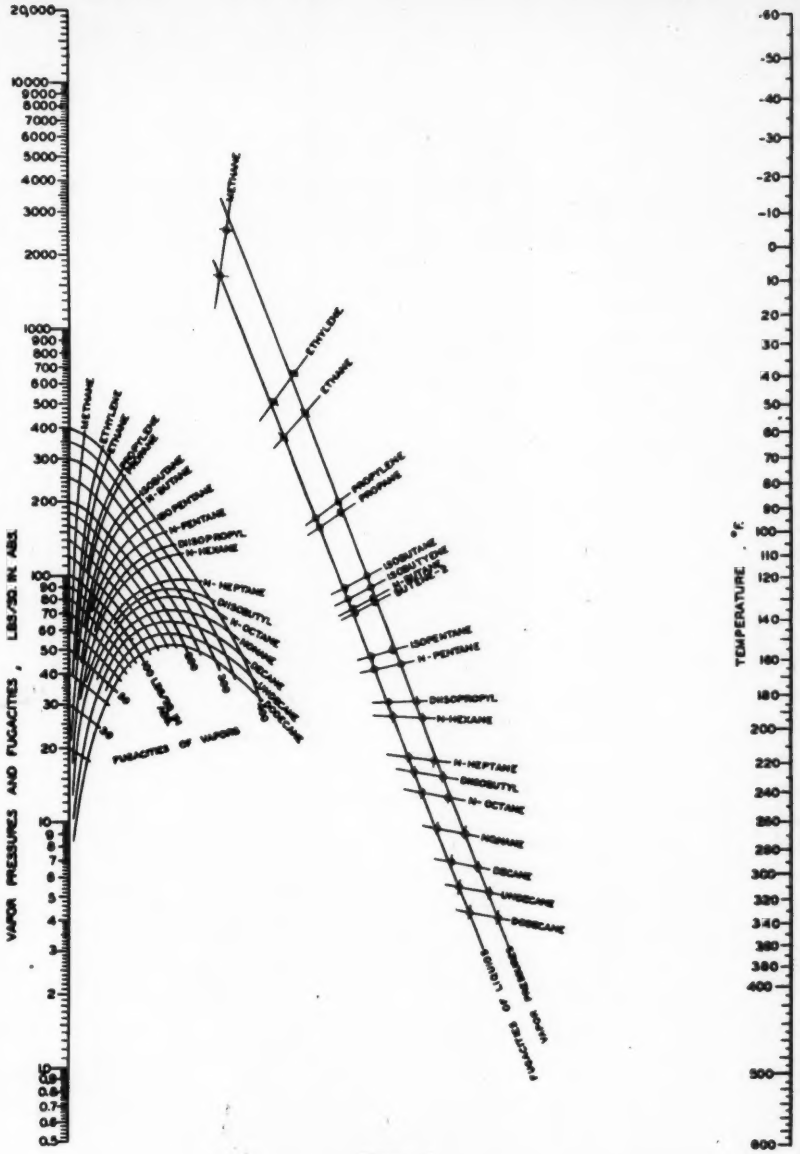
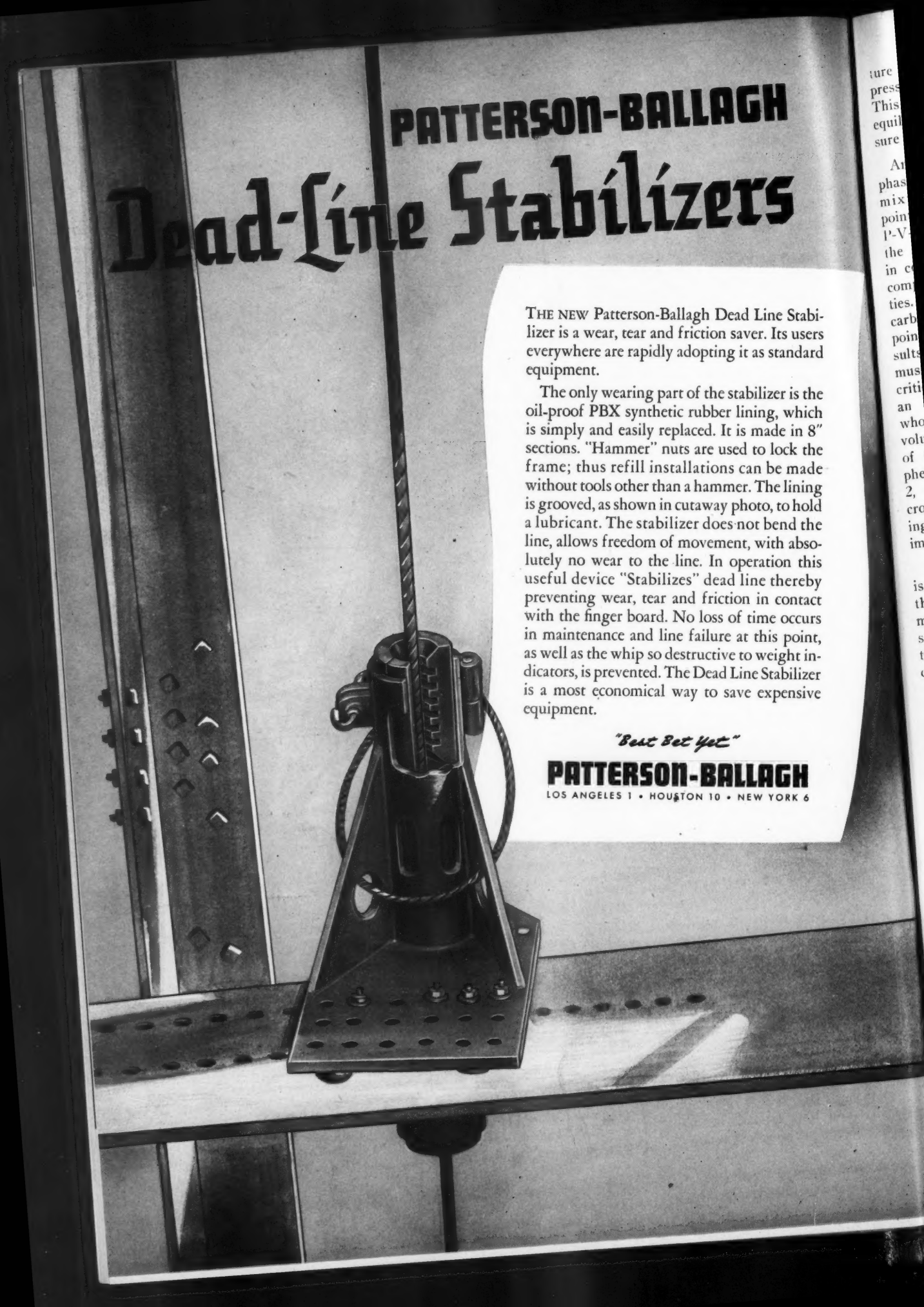


Figure 1

Vapor Pressures and Fugacities of Petroleum Hydrocarbons (see Reference 8).

quantity of a phase and one which reverses itself. Retrograde condensation or vaporization occurs when a phase appears, increases in quantity, reaches a maximum, and gradually decreases to complete disappearance during a process in which one independent variable relating to the system as a whole is continuously changed in value in the same direction, while other variables are held constant. Temperature and pressure are the variables most commonly associated with the phenomena, which is illustrated by the isotherm shown on Figure 2. Had the critical point been nearer the cricondentherm point, isobaric retrograde condensation would occur. It is possible to have both isobaric and isothermal retrograde condensation on the same mixture.

The critical point of a hydrocarbon mixture is a function of the composition, the critical temperature being a much simpler correlation than the critical pressure. Boiling range and "fill" have appreciable effects on the critical pressure. It is not an uncommon occurrence for the critical pressure of a mix-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ture to be higher than the critical pressures of any of the components. This fact is important in phase equilibria calculations for high pressure operations.

Another important point in the phase diagram of a hydrocarbon mixture is the "pseudo-critical" point, which is used in correlating P-V-T data. For pure components the actual critical points are used in correlating the P-V-T data and computing the generalized properties. For multi-component hydrocarbon systems, the true critical point does not give satisfactory results, so a "pseudo-critical" point must be used instead. The pseudo-critical point is the critical point of an imaginary pure compound, whose isochors (lines of constant volume) coincide with the isochors of the mixture in question. This phenomena is illustrated by Figure 2, where the isochors are shown crossing the border curve and joining the vapor pressure curve of the imaginary component.

The pseudo-critical point, which is a very powerful tool in applying thermodynamics to hydrocarbon mixtures, may be estimated as the sum of the products of the mol fractions and the true criticals for each component.

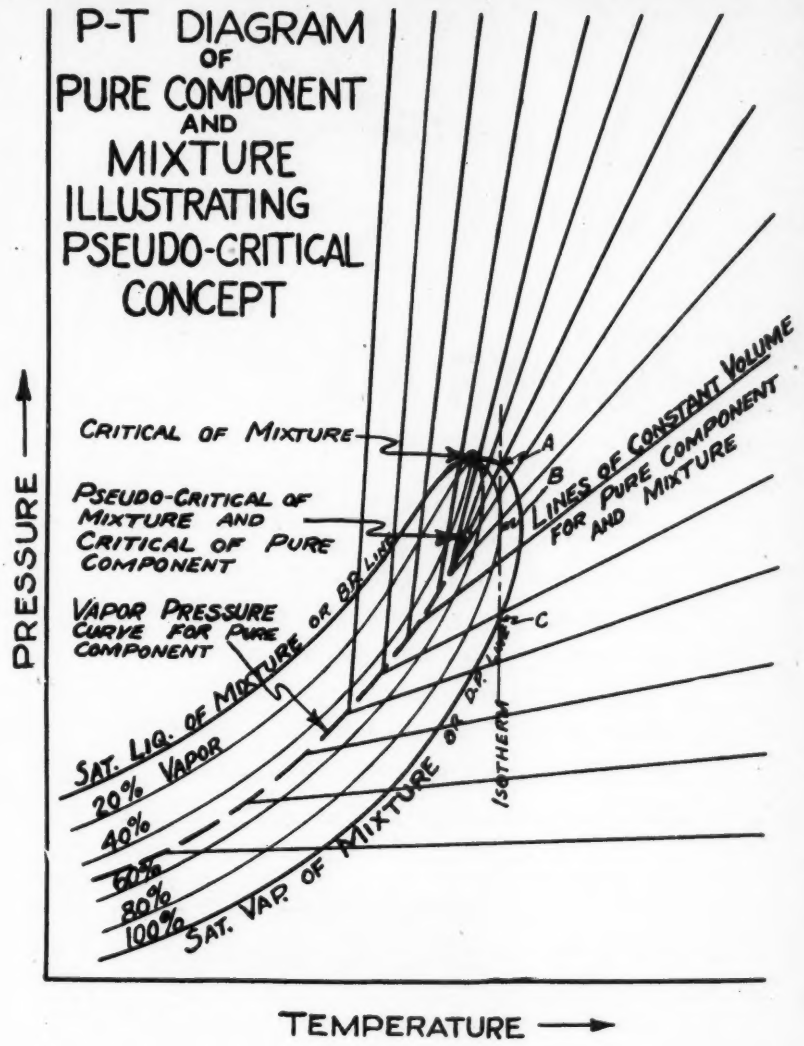

Figure 2
P-T Diagram of Pure Component and Mixture Illustrating Pseudo-critical concept and Retrograde Phenomena (Reference 17).

P-V-T CORRELATIONS

Pressure-volume-temperature behavior data are required for the vapor phase in applying thermodynamics to hydrocarbons. Correlations of such data are required in estimating vapor densities as well as the thermodynamic properties. Algebraic relations of P-V-T are known as equations of state, the simplest of which is the perfect gas law equation,

$$PV = RT$$

This simple equation can be applied to actual gases with sufficient accuracy for engineering purposes only at low pressures. There are several more accurate and complicated equations of state but the accepted practice in hydrocarbon calculations is to use a graphical P-V-T correlation. Two such correlations are presented as Figures 5 and 6. In both of these correlations, deviations from the perfect gas law are plotted against reduced pressure and temperature, thus giving generalized P-V-T correlations and applying to all hydrocarbons.

The PV/RT plot given in Figure 5 is accurate enough for computations of vapor densities for engineering calculations. However, this plot is not recommended for computing the derivatives of volume to be used in estimating thermodynamic properties of hydrocarbons.

This is due to the fact that the data for all the hydrocarbons do not fall closely enough to the curves and also because the nature of the plot does not adapt it to accurate graphical differentiation. The correlation given in Figure 6 is a plot of the reduced volume residual, which is the ratio of the volume residual to the critical volume residual, the volume residual being the difference between the ideal and actual gas volumes. In other words, Figure 6 is a correlation of the difference of ideal and actual gas volume while Figure 5 is a correlation of the ratio of actual to ideal gas volume. In addition to using another correlating variable (critical volume residual) which makes for more accuracy, Figure 6 is better adapted to graphical differentiation. Figure 6 is rec-

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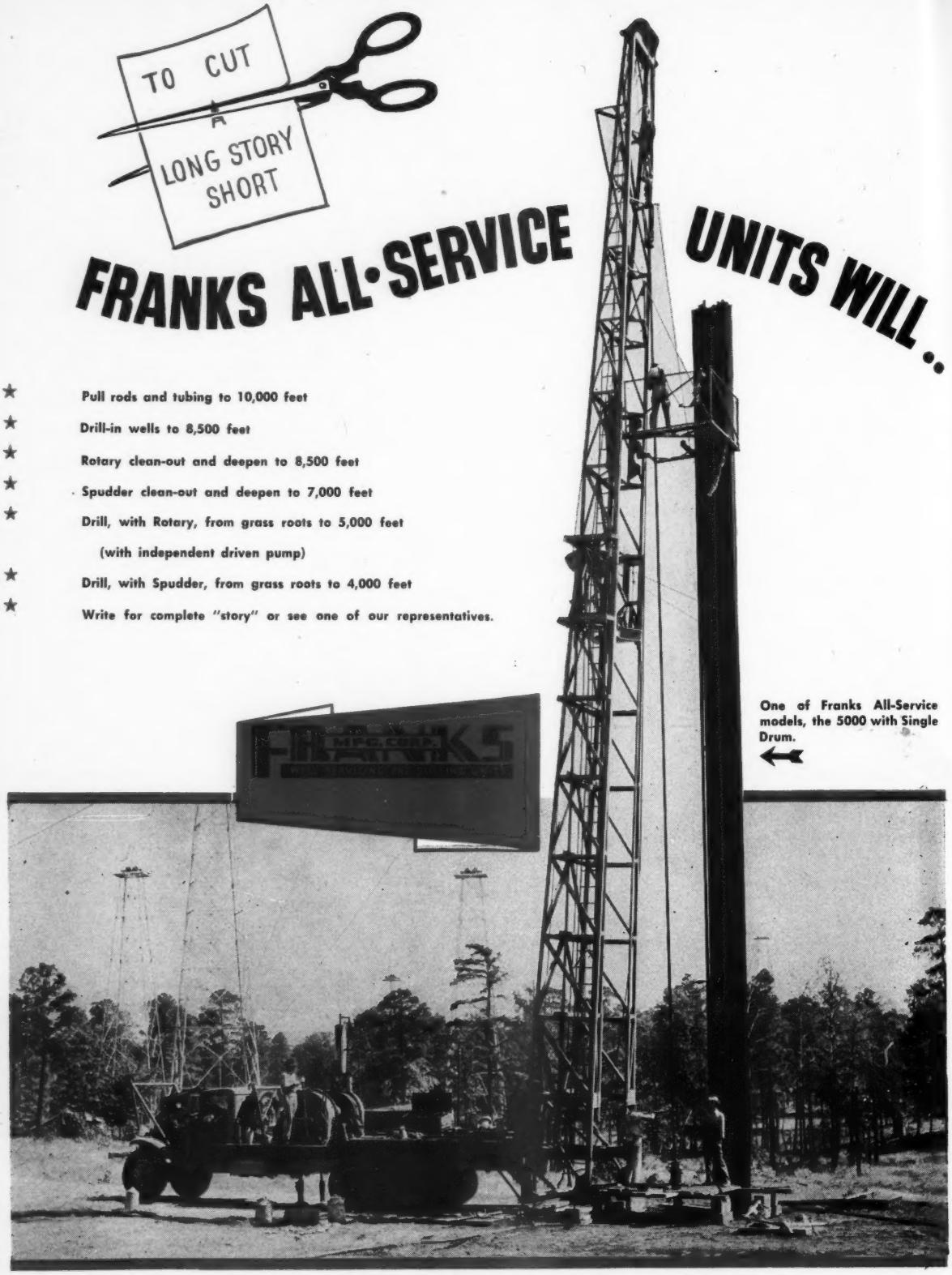

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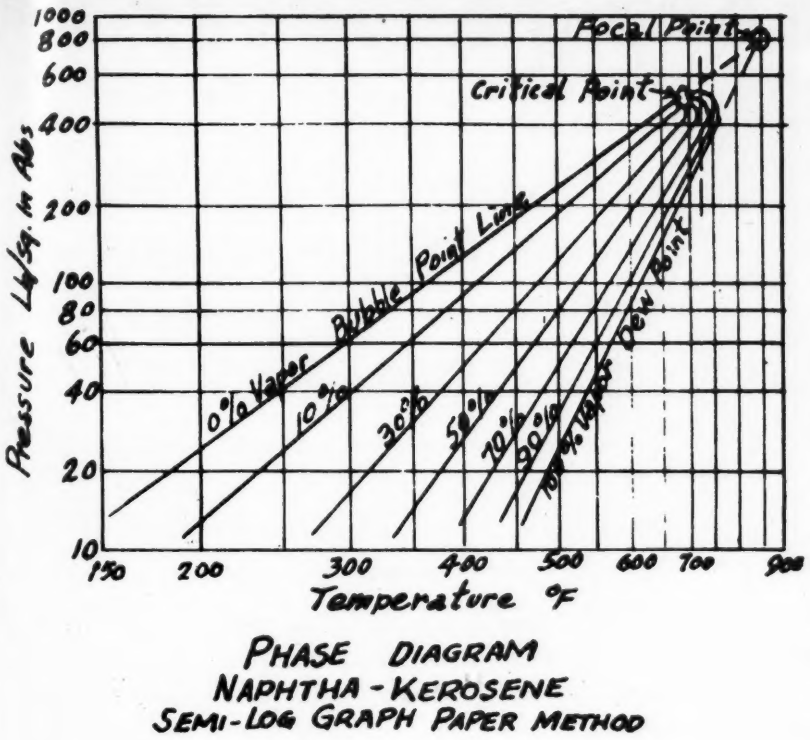

Figure 3

Phase Diagram of Naphtha-Kerosene; Semi-Log Graph Paper Method (Reference 13).

tropy charts require vapor heat capacity data in estimating the isobaric effect of temperature on the entropy and the enthalpy. The experimental determination of heat capacities requires precise equipment and a high degree of skill. Heat capacities of gases have been the subject of considerable experimental and mathematical study. Specific heats of gases may be found in two ways: (a) spectroscopic method, and (b) with an adiabatic calorimeter. Without going into the subject further, it is sufficient for these discussions to present the plot of vapor heat capacities in Figure 7. Heat contents of petroleum liquids and vapors have been determined, correlated and published in the technical literature.

Joule-Thomson coefficients are determined by measuring the temperature and pressure changes while throttling the vapor slowly. Since no quantitative fluid or heat measurements are involved, this determination is much easier than the measurement of specific heats. The isothermal pressure correction to

ommended for such thermodynamic calculations, while Figure 5 may be used in estimating vapor densities for engineering design purposes.

Both correlations may be applied to pure hydrocarbons and to mixtures, the latter being done by means of the pseudo critical. Figure 6 is the basis for the generalized thermodynamic correlations discussed later.

CALORIMETRIC DATA

In addition to volumetric and phase relation data, various kinds of calorimetric data are required in the development of charts and tables of thermodynamic properties of hydrocarbons. These required calorimetric data include: (a) heat capacities for liquids and vapors; (b) Joule-Thomson coefficients for vapors; (c) heats of vaporization, and (d) heats of formation and combustion. By means of thermodynamics a minimum of calorimetric data may be made to go a long way.

The preparation of enthalpy-en-

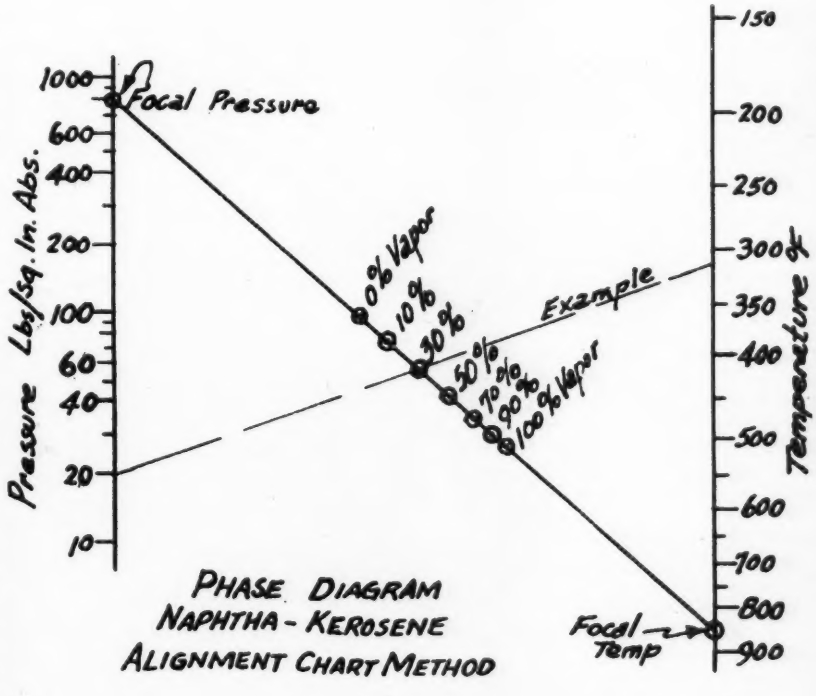

Figure 4

Phase Diagram of Naphtha-Kerosene; Alignment Chart Method.

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*Valuable man hours, formerly spent in re-packing pumps and lost down-time, can now be put to productive use.

At left is illustrated a Hydropress; the center a Process; at right a special N. Type Byron Jackson Stuffingboxless Pump.

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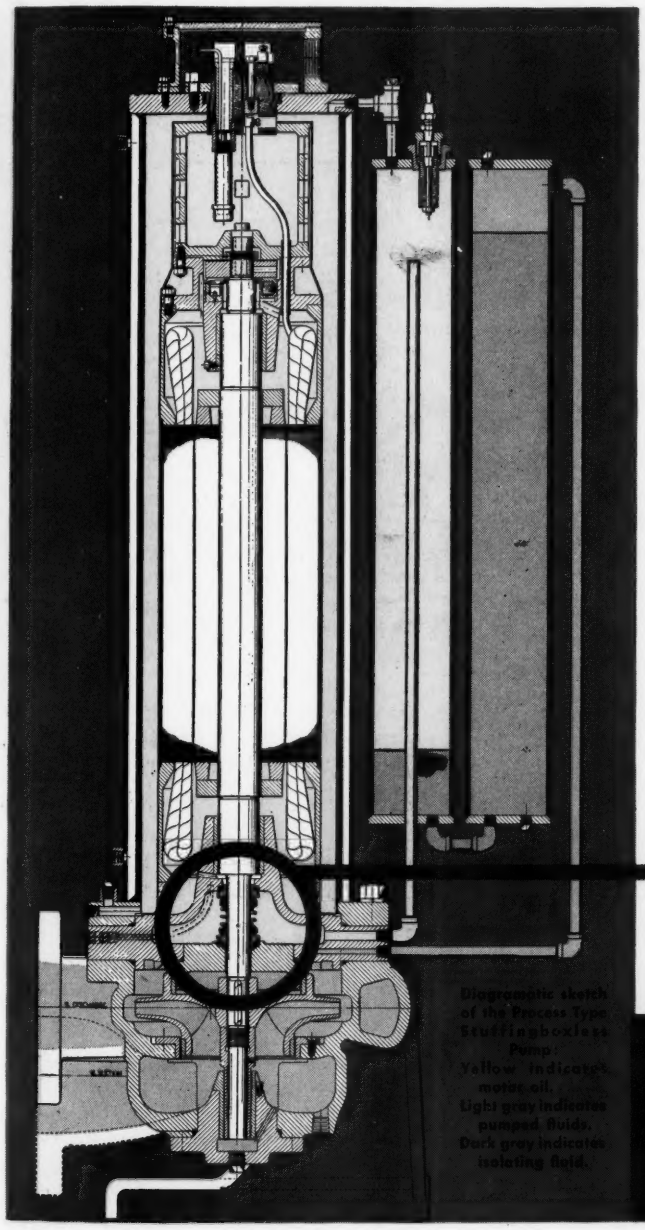

Diagramatic sketch of the Process Type Stuffingboxless Pump: Yellow indicates motor oil. Light gray indicates pumped fluids. Dark gray indicates isolating fluid.

Basically different, this pump does away with the necessity for the conventional stuffingbox, frequent repacking and lost down-time by the substitution of a simple mechanical seal, operating under a low fixed pressure differential. Built integrally with the motor—using any one of several standard type Byron Jackson Pumps—the Stuffingboxless Pump is explosion proof. Pumped fluids cannot be either contaminated or lost in their handling.

Since there is no escape to atmosphere of pumped liquid, the Stuffingboxless Pump is ideally suited for the pumping of butane, propane, pentane or other volatile fluids. Where the product being pumped is of high value, savings from leakage have quickly amortized pump installation costs. Capacities, heads and temperatures available with the Stuffingboxless Pump cover an extremely wide range. By proper selection of pump type a large variety of individual requirements can be met. Any Byron Jackson engineer will be glad to furnish complete details on the application of this new and improved method of pumping.

The outstanding feature of the Stuffingboxless Pump is the employment of a low fixed pressure differential at this point—the seal—which remains constant at any given capacity or head, regardless of change in suction pressure.

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the enthalpy can be measured by a similar procedure, in which heat is added during the expansion to maintain the outlet temperature the same as the inlet temperature. In this experiment the fluid flowing and the heat added must be measured. This amounts to combining the Joule-Thomson coefficients and the specific heat determinations in one experiment. As a matter of interest, the isothermal effect of pressure on the enthalpy may be computed from P-V-T data by thermodynamic equations.

The latent heat of vaporization is required in preparation of enthalpy plots. This heat quantity may be determined experimentally or it may be computed from precise volumetric and vapor pressure data. Experimental data are desired, although the determination of latent heats of vaporization is not a simple matter. For pure components the calorimeter would operate at constant temperature and pressure, while for mixtures one or the other must be varied. The heat of vaporization decreases as temperature and pressure are increased, the value being zero at the critical point.

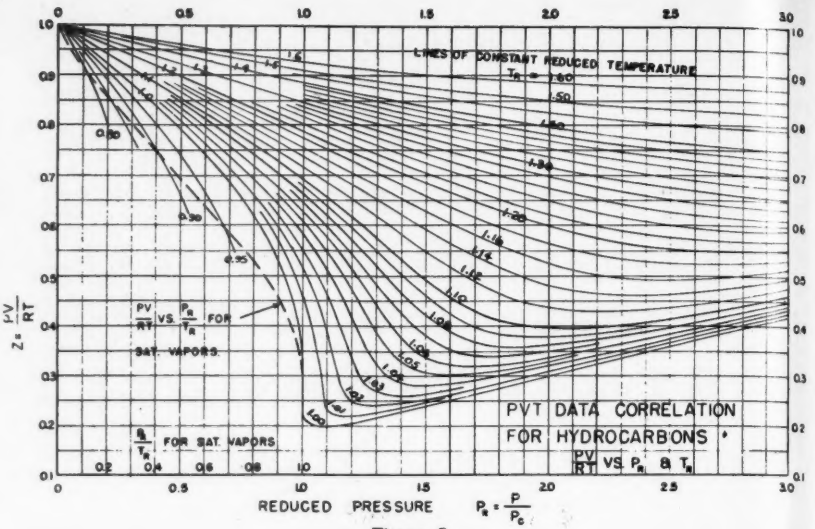


Figure 5

P-V-T Data Correlation for Hydrocarbons; PV/RT Method (References 4, 5, 11, 21).

Figure 8 is a plot of the molal entropy of vaporization vs. reduced temperature for hydrocarbons. This plot which was prepared from experimental and calculated data, may be used in estimating the latent heat of vaporization for mixtures as well as for pure components. Knowing the latent heat of vaporization at one point, the heat of vaporization at other points may be computed as follows:

$$\Delta H_2 = \Delta H_1 \left(\frac{\phi_2}{\phi_1}\right)\left(\frac{T_2}{T_1}\right)$$

Where values of ϕ are the molal entropies, values of T are the absolute temperatures, and values of ΔH are isothermal latent heats or the difference between the saturated vapor and liquid lines at the same temperature. The value of the latent heat at the starting point, ΔH, should be at a sufficiently low temperature where pressure has little or no effect on the heat of vaporization.

It is of interest to point out that the "isothermal" latent heat of vaporization, defined in this way, is not zero at the critical temperature, but is zero at the cricondentherm point or the point of maximum temperature on the border curve.

In computing the reduced temperature make the ϕ readings from Figure 8 and applying the above equation, the cricondentherm or point of maximum temperature should be used instead of the critical or pseudo critical so that the

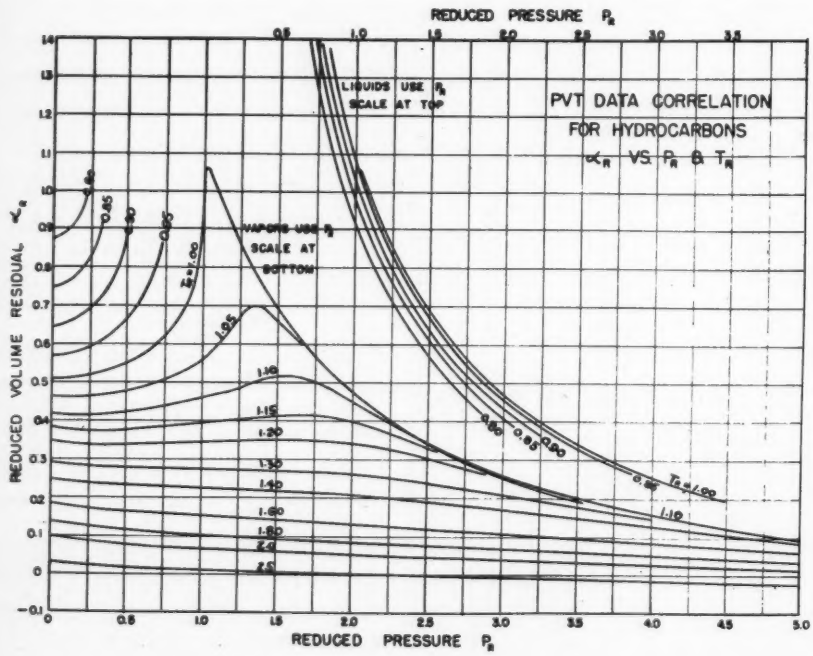
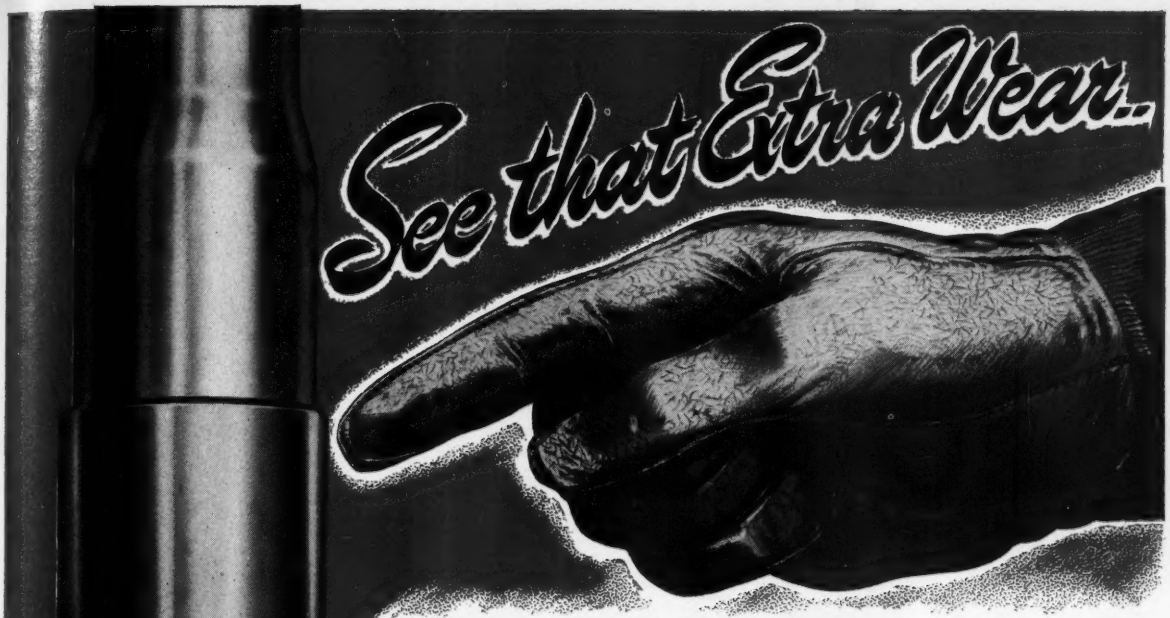


Figure 6

P-V-T Data Correlation for Hydrocarbons, Reduced Residual Volume Method (Reference 6).



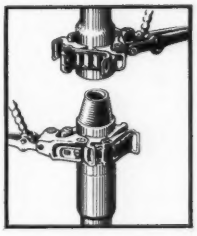
THAT'S ONE REASON I LIKE THE

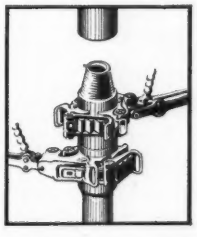
HYDRIL *OS "TWINPIN"

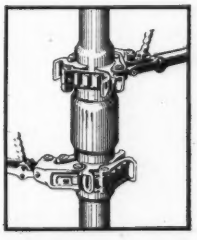
AND HERE'S ANOTHER REASON...

IT'S ALMOST AS EASY TO CHANGE AS A LIGHT BULB

API or HYDRIL THREAD







The Hydril OS "Twinpin" is a combination drill pipe connector and wear sub. It not only protects your drill pipe, but also gives you a flexibility in drill string handling impossible with conventional joints. Changed in a matter of minutes with regular rig tongs, the Twinpin makes it easy to reverse any joint of pipe, to distribute tong wear, slip cut and thread wear . . . or to reverse the entire string when coming out to move to a new location.

Drill pipe always in service—longer drill pipe life—these are the advantages of Hydril OS "Twinpin" Drill Pipe Connectors.

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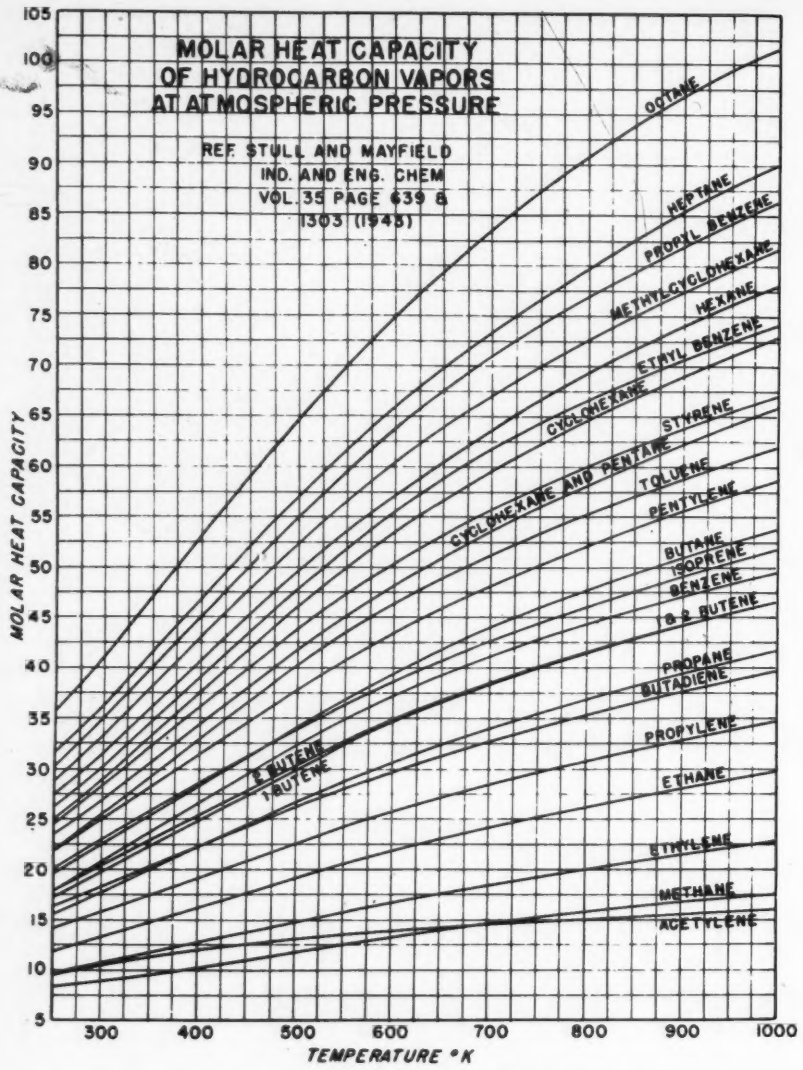


Figure 7
Molar Heat Capacity of Hydrocarbon Vapors at Atmospheric Pressure (Reference 29).

isothermal heat of vaporization for the mixture will be zero at the maximum temperature on the border curve.

Heats of combustion have two applications in hydrocarbon processing; (a) combustion calculations and (b) heats of formation and decomposition. The complete combustion to CO_2 and H_2O with an accurate measurement of the heat evolved, is readily accomplished in a constant volume bomb calorimeter. In most applications of calorimetric heat of combustion data, the process occurs at constant pressure rather than at constant volume, making it necessary to correct the calorimetric data to a "net" basis by allowing for the heat of condensation of the water formed in the combustion. Heats of combustion of hydrocarbon gases is readily determined at constant pressure.

DERIVED THERMODYNAMIC CORRELATIONS

The intermediate step between the thermodynamic equations and the experimental data on the one hand and the finished charts and tables of thermodynamic properties on the other hand is the development of derived thermodynamic correlations, such as those presented in Figures 9, 10, 11, and 12. These correlations were prepared by graphical methods, using the equations given in Table III and the data correlations discussed above.

Figure 9 is a plot of fugacity sloping bar as shown pressure ratio as a function of reduced temperature and pressure. This plot is for use in estimating fugacities of liquid and vapor hydrocarbons. The total pressure is used in calculating vapor fugacities while the vapor pressures are used in computing liquid fugacities, both readings being made at the same temperature, i.e. the temperature for which the equilibrium constants are desired. The critical conditions of the individual components are used in applying this chart. In using this chart to estimate phase equilibria constants for hydrocarbons, readings must be made for some components at conditions below their boiling point or where the components would be all liquid if not in a mixture with lighter components. In order to make the f/p plot applicable to these conditions the low temperature curves have been extended beyond the range obtained from P-V-T data. This has been done by means of experimental data. Therefore, Figure 9 represents a composite of experimental data and thermodynamic calculations.

Figure 10 is a generalized plot of the isothermal pressure correction to the enthalpy of vapors as a function of reduced temperature and pressure. The constant K_3 is in the same units as ΔH and is a function of the critical properties of the hydrocarbon or mixture in question, being equal to 0.1851 $Pc \propto_c$ BTU/Lb., where Pc is in lbs/sq. in. abs. and $\propto_c$ in cu. ft. /lb. Thus the ordinates and parameter of Figure 10 are "reduced" properties depending upon the critical conditions. The critical residual volumes are not usually known for hydrocarbons or mixtures. However, K_3 can be correlated with Pc and Tc very readily. Figure 10 was developed entirely from P-V-T data by the methods described above using the P-V-T correlation shown on Figure 6.

It is of interest to point out that this correlation was developed for pure hydrocarbons but has been

used for mixtures as well as other gases such as SO_2 with satisfactory results. In applying the correlation to hydrocarbon mixtures or petroleum fractions, pseudo critical conditions must be used.

Figure 11 is a similar generalized plot giving an entropy function. In this case the constant K_2 is in the units as S^1 and equal to $Pc \propto c/Tc$. With reference to the use of this plot, it should be noted that Figure 11 gives part of the isothermal pressure correction to the entropy, the balance being obtained by integrating pressure as shown in the equation given in Table III. By means of Figures 10 and 11 and the critical properties, the isothermal effects of pressure on the entropy and enthalpy may be estimated for pure hydrocarbons and their mixtures. A similar plot has been developed to give the isothermal pressure correction to the specific heat of vapors at constant pressure.

In Figure 12 ratios of specific heats at constant pressure and constant volume are shown as a function of reduced temperature and pressure for various pure hydrocarbon vapors. This chart was developed from specific heats at a constant pressure of one atmosphere and the thermodynamic functions described above. This correlation

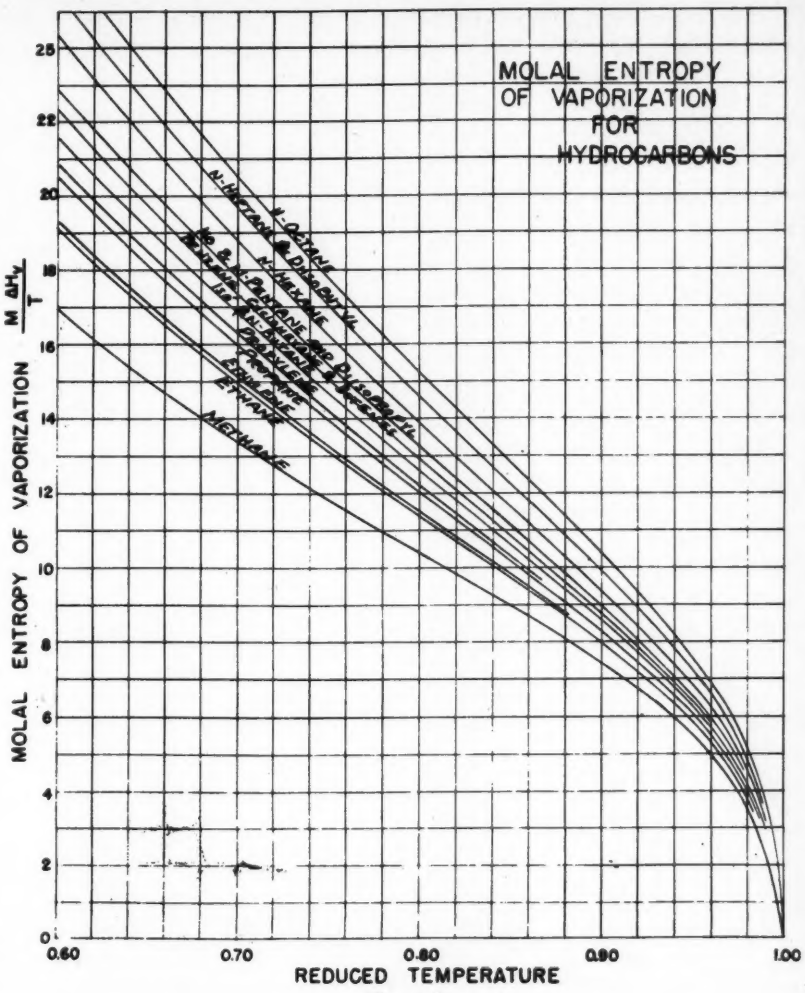


Figure 8
Molal Entropy of Vaporization for Hydrocarbons (Reference 32).

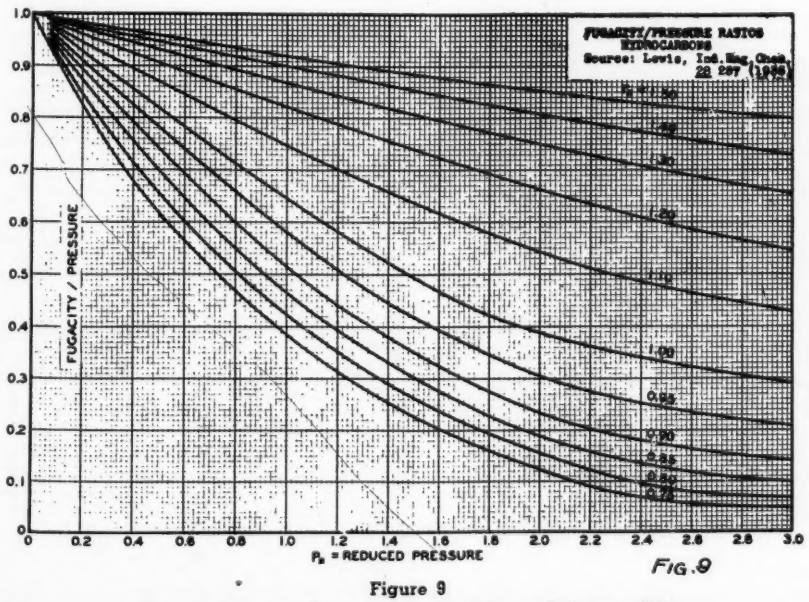

FUGACITY/PRESSURE RATIOS HYDROCARBONS
Source: Lewis, Ind. Eng. Chem. 22 297 (1930)
FUGACITY / PRESSURE
P_R = REDUCED PRESSURE
FIG. 9

Figure 9
Fugacity/Pressure Ratios for Hydrocarbons (Reference 21).

shows the effects of temperature and pressure on the specific heat ratio. The C_P/Cv values may be determined for mixtures by assuming the values for individual components are additive or by using pseudo critical conditions and average molecular weights.

There are two methods of making hydrocarbon gas compression calculations in use. One method is to compute the work and final temperature by means of the following well known equations.

$$HP = \frac{144\ P_1 V_1}{33000} \left(\frac{\gamma}{\gamma-1}\right)\left[\left(\frac{P_2}{P_1}\right)^{\frac{\gamma-1}{\gamma}} - 1\right]$$

$$T_2 = T_1 \left(\frac{P_2}{P_1}\right)^{\frac{\gamma-1}{\gamma}}$$

The other method is to use entropies and enthalpies, following a line

of constant entropy to get the final temperature, and then finding the work equivalent of the difference in enthalpies at the initial and final temperatures.

The above compression equations are based on the perfect gas law and not strictly valid for actual gases such as hydrocarbons. These equations have been used on air for years with good results but air is much closer to a perfect gas than hydrocarbon vapors are. Another well known application of the above equations is for the compression of ammonia in refrigeration cycles. Here also satisfactory results are obtained as judged by good agreement with Mollier diagram results. The explanation for this good agreement lies in the value of the exponent used. It appears that the value of γ used in the above equations was selected to give good agreement with Mollier the diagram results. The same could be done for any gas, steam, SO_2 or hydrocarbons. Such values of γ would be pseudo specific heat ratios and not actual Cp/Cv values. It should be emphasized that the values of C_P/Cv given in Figure 12 are not pseudo values designed to be used with the above equations to give results comparable with Mollier diagram calculations. It would be desirable to develop such a correlation or, as an alternate, modify the above compression equations to be valid for actual gases.

The above inconsistency between Figure 12 and the perfect gas law compression equations is an answer to criticisms of this Cp/Cv correlation. Another point to be mentioned in this connection is that the temperature of the gas leaving a compressor is not always the same as the temperature leaving the cylinder due to the design of the valves and the gas passages around the cylinder. For this reason, the work of compression should be computed for an isentropic compression and the exit temperature obtained by correcting the isentropic temperature for the design of the gas coolers following the compressor.

Note: The literature references indicated in the titles of Tables and Figures are given in the bibliography at the end of the second half of this article.

End of Part I.

The second part or conclusion of this article by Mr. Edmister will appear in the next, First December, issue.—Editor.

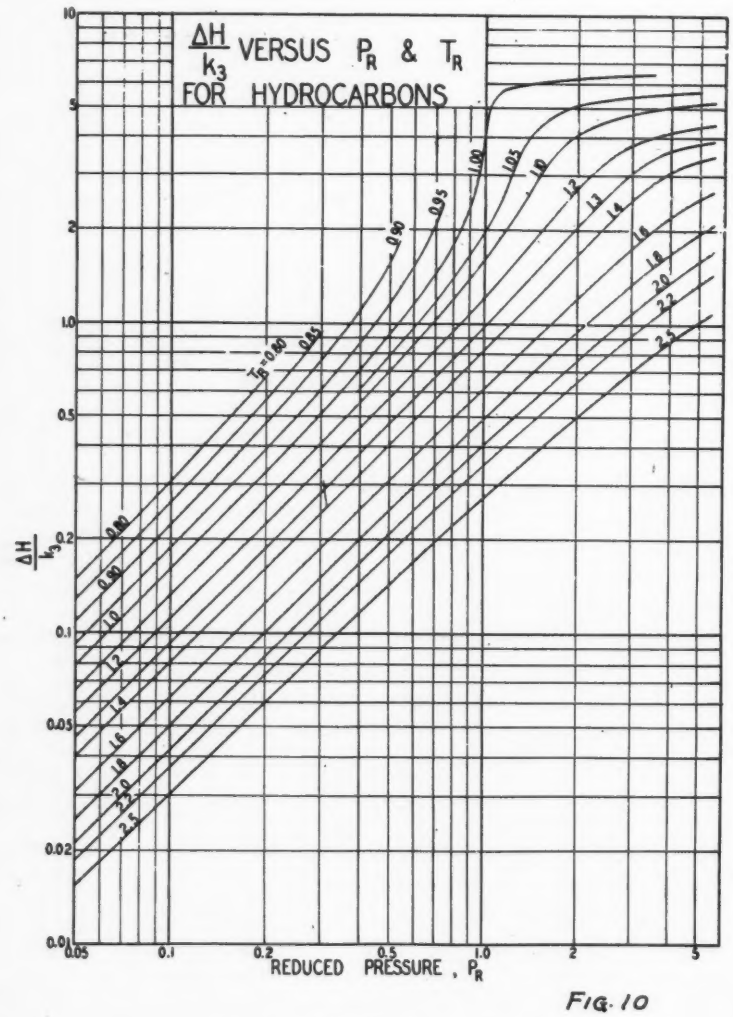


Figure 10
Generalized Correlation for Computing Isothermal Pressure Correction to Enthalpy (Reference 6. See also References 10, 18, 24, 26, 35, 36).

Charts 11 and 12

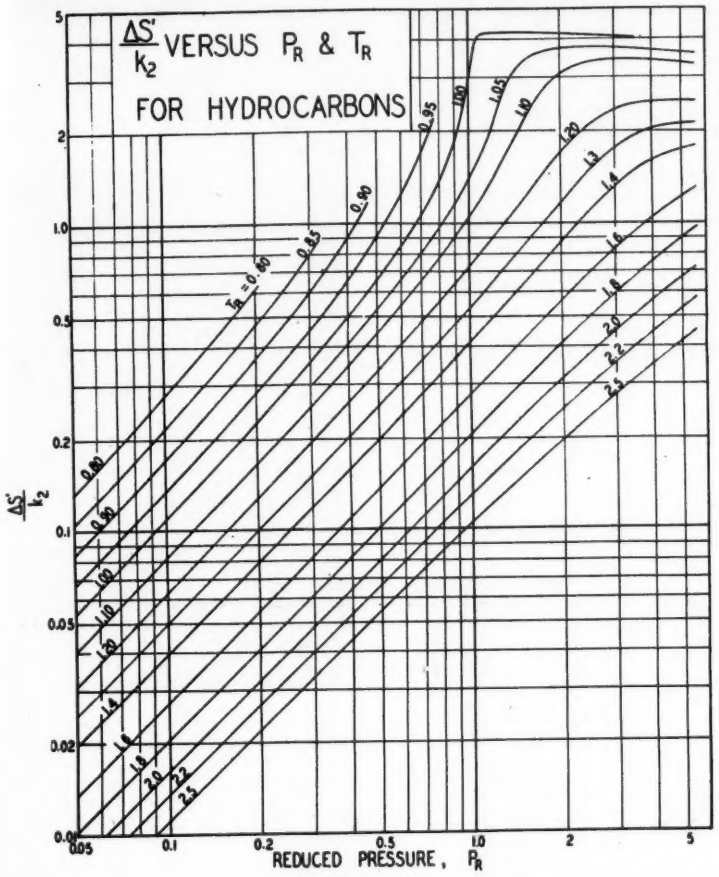


Figure 11

Generalized Correlation for Computing Isothermal Pressure Correction to Entropy (Reference 6).

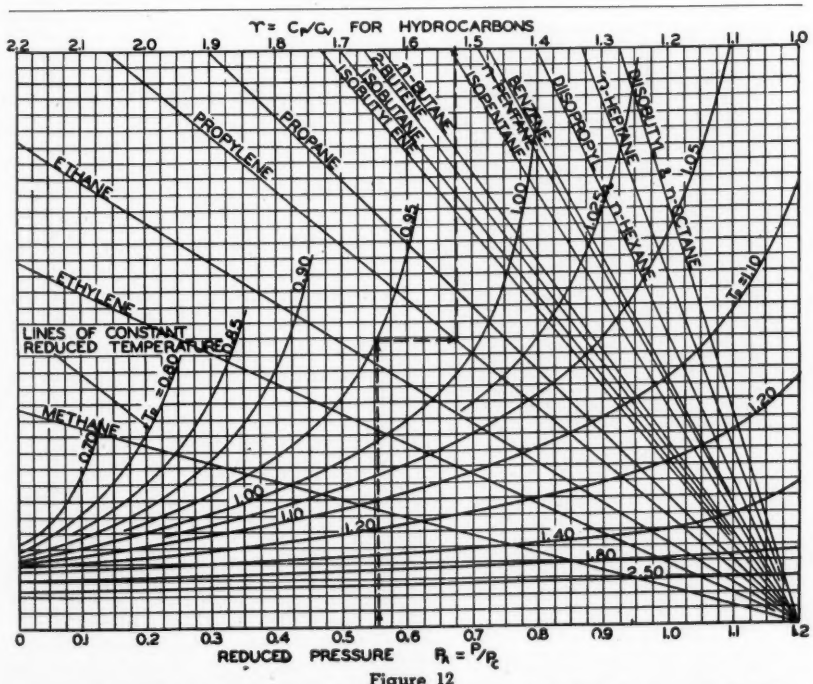


Figure 12

Specific Heat Ratios for Hydrocarbons (Reference 6. See also References 25, 37).

Carrington King

(Continued from Page 3)

of The Texas Co., who told Senator O'Mahoney such vessels should "in no case be used in commercial operation".

The O'Mahoney Committee, although taking a recess Thanksgiving Week, is planning on resuming its hearings, Nov. 26. Petroleum Administrator for War Ickes and Deputy Administrator Ralph K. Davies, will star at the next session, at which the PAW will make its presentation before folding its tents and stealing away into oblivion. Approximately 10 division directors of the war-time agency also will be heard by the committee.

The dust-up over alleged "tampering" with the Anglo-American treaty had few repercussions. It did, however, provoke a few hearty laughs and considerable curiosity as to who, in Texas, might be behind the turmoil.

Attention to the matter was called by Sen. W. Lee ("Pass the Biscuits Pappy") O'Daniel, Texas Democrat, who has long been opposed to the idea of piping natural gas from his home state to the gas-less East. O'Daniel introduced in the Record a long letter from the Independent Petroleum Association of Texas and clippings from the Texas newspapers quoting Land Commissioner Bascom Giles and Chairman Olin Cluberson, of the Texas Railroad Commission on the fearsome "hidden dangers" of the oil pact.

Most of the furore arose from a change of one word in the agreement signed last September in London. According to Culberson, the "startling difference" from changing the text to read "those British Colonies," instead of "all British Colonies" will leave the British to "handle the bulk of their oil as they see fit while subjecting this country's petroleum resources to an oil cartel."

Since only the territories included in a list exchanged with the U. S. Government will be affected under the "new language" of the treaty, and since Burma and Kuwait are not on the list, these colonies will not be included in the agreement, he argued.

(Continued on Page 40)

Changes Announced in Geological Dept. of G. P.

Transfers and advancements of seven petroleum geologists and engineers of the General Petroleum organization in California are announced by C. M. Wagner, manager Geological department, General Petroleum Corporation.

C. J. Dean

C. J. Dean, senior petroleum engineer since 1941 and with the corporation since 1923, has been transferred to Socony-Vacuum Company, C. A., Venezuela, as chief petroleum engineer, Production department, with headquarters at Caracas. Aside from being well known in petroleum and geological circles, Mr. Dean is well remembered in California and elsewhere as a tackle on the "Wonder Team" of the University of California.

R. O. Swayze, assistant manager Geological department, is transferred to the Production department and made assistant manager of the Rocky Mountain division. He has been with General Petroleum since 1921.

J. C. Kimble, senior geologist, who has been with the corporation since 1935, is appointed assistant manager (exploration) of California district.

E. L. DeMaris, chief petroleum engineer, is advanced to assistant manager (exploitation) of California district. He has been with the corporation since 1923.

F. L. Wadsworth, petroleum engineer, who joined the organization in 1935, becomes chief petroleum engineer of California district.

E. J. Coenen, petroleum engineer with the company since 1935, is made petroleum engineer for the San Joaquin Valley division.

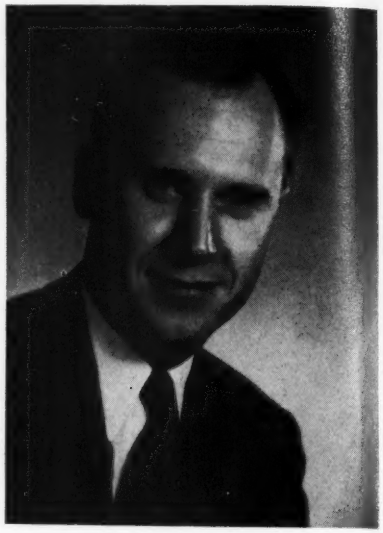
A. P. Bowie, assistant petroleum engineer, employed in 1944, is appointed petroleum engineer for the east side of the San Joaquin Valley division.

Binford Appointed V. P. of Marine

In line with general expansion of its sales and production facilities, W. M. Binford, long prominent in the insulation business in the West, has just become associated with Marine Engineering & Supply Company and has been elected vice-president of that firm, Larry Hanson, president, announced. Mr. Binford was formerly assistant vice-president and district manager of Plant Rubber & Asbestos Works, a wholly owned subsidiary of Paraffine Companies, Inc. He was affiliated with that company for the past 17 years and previously, for four years, was with the Southern Asbestos & Magnesia Company, which was bought by Plant Rubber in 1928.

W. M. Binford

Marine Engineering & Supply Company is one of the leading concerns in the insulation field in Southern California. During the war, Marine insulated over 500 ships of every description, $175,000,000 of high octane plants, and a wide variety of other jobs for industrial plants, housing projects, refrigeration, and rubber plants. Marine supplies many different types of insulation for both heat and cold, from a minus 400 degrees to a plus 2600 degrees Fahrenheit.



G. L. Van der Boom, formerly Advertising Manager of Southwest Welding & Manufacturing Company, Alhambra, California, has joined Russell P. Ostrander, Advertising, in the capacity of Account Executive.

Mr. Van der Boom has over ten years experience in the sales and advertising divisions of industrial equipment concerns. He will be active as an Account Executive mainly in the automotive, construction equipment and steel fabricating fields. His addition to the staff of Russell P. Ostrander, Advertising, will still further expand the agency's facilities in industrial advertising fields.

Mensing Advanced by National Supply Co.

John B. Mensing, Assistant Treasurer of The National Supply Company, has been appointed General Credit Manager replacing Dana J. Fox, who is resigning to become President of Fretz-Moon Tube Co.

Mr. Mensing has been in the Credit and Treasury Departments of National for over twenty-five years.

Waldron Johnson Back in Civvies

Cecile Johnson of Oceanic Oil Co. in Los Angeles was brimming over with joy the other day when her husband, Waldron Johnson, arrived back home after several years active duty with the Navy as navigator. He participated in almost every campaign in the Pacific theater.

Field Development

PREPARED BY CALIFORNIA OIL WORLD NEWS SERVICE

Los Angeles Basin

West Coyote Try Schedules Retest

Barnsdall Oil Co. has decided to retest its third well on the Sunny Hills Ranch near West Coyote. Located in sec. 21-3s-10w, Orange County, total depth is 6982 ft. The trial now in preparation will be above 6500 ft.

Leffingwell Test Continues Drilling

A number of companies are understood to be giving back their leases in the Leffingwell area, east of the Santa Fe Springs field, where Standard of California continues to drill steadily ahead at 11,128 ft. in Lewis Comm. No. 1 in sec. 11-3s-11w, Los Angeles County.

Gardena Explorer Still Making Tests

Ohio Oil Co., which has been working over its Gardena Comm. No. 1 wildcat in sec. 24-3s-14w in the Gardena area for several weeks, at last reports was continuing to perforate and test an interval not reported.

Drilled to a bottom of 10,594 ft. water evidently has been a problem. Some progress in this direction was reported at one time when a heading flow showed a pronounced diminution in water cut.

Work Expands At West Newport Area

Macoil Co., which recently chalked up two new producers at West Newport, has just commenced drilling Banning No. 32, with the drill last reported making rapid time through surface formations at 650 ft. Banning No. 27 came in for 80 barrels daily from 1360 ft. No. 44 was finished at 1582 ft. for a yield of 125 barrels a day.

W. J. Cole's Newport Beach No. 1, and D. D. Dunlap and Dorothy Dunlap's No. 3 and No. 4 are still only locations.

Barnhart Morrow Consolidated has spudded Deeble No. 5 and has cellar built for Fairview Farms No. 1. The company's Newport Water Company No. 1 is standing idle, after swabbing dry on perforations in the interval of 2355-2367 ft.

At Costa Mesa, Sierra Trading Corp. is coring Sierra No. 2 in sec. 23-6s-10w at 2010 ft.

Aliso Canyon Tests Drilling Deeper

Seaboard Oil Co.'s Evans No. 1A on the plunge of the Pico anticline in the Aliso Canyon area is making hole ahead in conglomerate at a depth of 7600 ft. Location falls in sec. 23-3n-16w.

Standard Oil Co. is drilling and coring at 5102 ft. in Wigdal No. 1 in sec. 19, after losing and recovering drill pipe fish.

Marquis No. 1 in sec. 35, sponsored by Wilshire Oil Co., is making drilling progress through hard shale at 5890 ft.

Beach Depth Well Fishing Drill Pipe

The deepest hole ever drilled in Los Angeles County, Shell Oil Co., Inc., Alamitos No. 48A at Long Beach, has recovered drill pipe fish to 15,601 ft. and continues to fish. Total depth is 15,875 ft.

Dominguez Estate No. 1 in sec. 2-4s-13w in the Dominguez area is prospecting ahead at 8259 ft. An electric log was run to 8100 ft.

New Well Starts At East Coyote

Robert W. Ogle, independent operator of Pasadena, is rigging up to drill Yorba No. 1 some 905 ft. south and 150 ft. west from the northeast corner of the northwest quarter of sec. 19-3s-9w in the East Coyote field. Drilling contract has been let to Ralph M. Parsons Co.

Slate Redrill Of Harbor Well

Long Beach Harbor Oil Co. is fishing liner to redrill Cederhold Comm. No. 2 in the Long Beach harbor sector of the Wilmington field. President of the company is T. E. Adams, joint operator with Universal Consolidated of a wildcat now drilling at Del Valle.

Del Valle Well Reruns Tester

Universal Consolidated Oil Co. is preparing to rerun tester in T. E. Adams Aguirre No. 1 in sec. 13-4n-18w in the Kern sector of the Del Valle area, after packer evidently failed on the initial try. Total depth is 3049 ft., with 7-in. casing set at 2987 ft.

Other wells previously drilled in the Kern sector found three oil zones, the best of which was the second. Universal Consolidated is understood as having only penetrated the first zone to present depth. It is likely, therefore, the hole will be carried considerably deeper before completion attempts are inaugurated.

Beach Well Completed

Shell Oil Co., Inc., has recompleted Bryant No. 9-15 in the Seal Beach field flowing 488 barrels of clean 28.1 gravity a day from a plugged depth of 7720 ft. The 7-in. pipe is cemented at 7970 ft. and perforated in the intervals of 6220-6955 and 6975-7045 ft.

Meanwhile, Atlantic Oil Co. and O. M. Slosson are planning to embark upon a drilling program involving seven wells in the Seal Beach field on a lease embracing 70 acres of the Fred Bixby property. The first well is to be an offset to Shell Oil Co.'s Bryant No. 2-1 well.

New Del Valle Exploratory Job

Slightly less than one mile west of the Del Valle field, the Superior Oil Co. and British-American Oil Prod. Co. have staked location for Black No. 1, a wildcat test, 2500 ft. south and 1150 ft. west of the northeast corner of sec. 13-4n-18w.

This same operating combination recently abandoned Handy No. 1 located due west of the westerly portion of the field in sec. 18-4n-17w, at a total depth of 10,095 ft. It had the distinction of being the deepest well ever drilled in the Del Valle area, from a stratigraphic aspect and based on the number of geologic sections penetrated. The well ran high on structure, but unfortunately was dry.

Bandini Wildcat Reports Oil Sand

Richfield Oil Corp. is ready to run casing in U. P. Unit No. 1 in sec. 9-2s-12w in the Bandini area, which has been carried to a total depth of 8608 ft. The try is credited with some 40 ft. of oil sand below 8550 ft.

Originally designed as a deep test, the well probably will explore to more conclusive levels in order that production possibilities are fully scrutinized. Thin oil sand streaks in gray sand are reported as having showed for several hundred feet in drilling to present bottom.

Simons No. 1, another Richfield try, in sec. 15 is drilling ahead at 5100 ft. in sec. 21. C.C.M.O. Co. is spot coring in Bandini No. 1 at 5982 ft.

Turnbull Try Rigging Derrick

A new wildcat test is rigging up in the Turnbull area of Los Angeles County in sec. 17-2s-10w. It is known as William Rowland Estate No. 1 and is sponsored by A. W. Lyddon, Operator, in sec. 17-2s-10w.

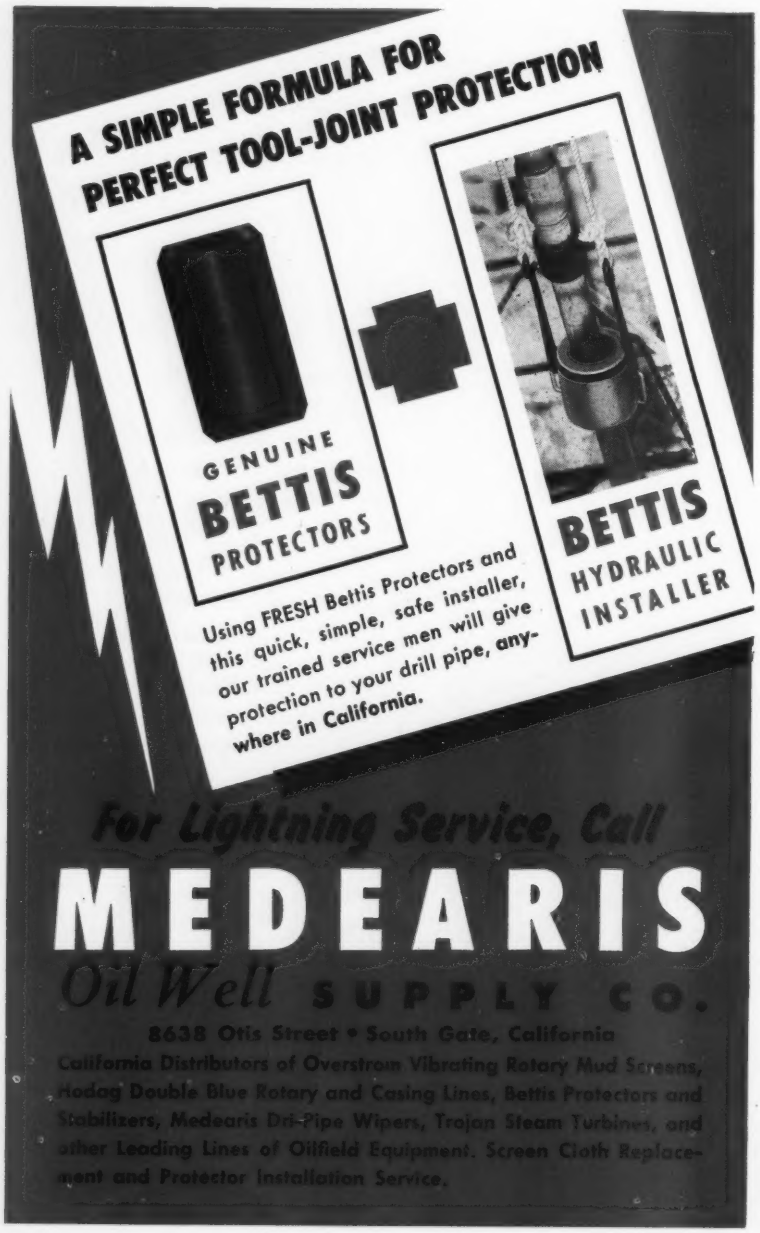
Playa Del Rey Gas Test Quits

Having found the upper sands gray, Southern California Gas Co. has abandoned S.C.G. No. 1 in sec. 28-2s-15w in the Playa Del Rey area. Total depth was 3188 ft.

Desert Attracts New Test Drilling

In the northeastern corner of Los Angeles County in sec. 33-8n-8w in Antelope Valley, Lehr Co. has made location for well No. 1 in the Hi Vista district.

Near Palmdale, Del Sur Oil Co. is making hole ahead at 1550 ft. in Del Sur No. 1 in sec. 26-7n-13w. Young Bros. are in charge of drilling.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San Joaquin Valley

Edison Schist Play Increasing

Ever since H. H. Magee proved the schist basement in the Edison field substantially productive, interest in this source of new oil has been increasing steadily.

Richfield Oil Corp. plans a shot at the schist through the medium of Cauley No. 2-1 in sec. 16-30s-29e, which was originally completed early this year for about 80 barrels daily from 4794 ft. Liner now is being fished to deepen into schist.

The Texas Co., Hintz No. 1 in sec. 23 is drilling at 2088 ft., in schist, top of which was placed at 2010 ft. About 5 ft. of oil sand was logged just above schist. A 2¾ hours formation trial of the interval of 2005-2060 ft., recovered 910 ft. of gassy oily mud.

Union Oil Co.'s Rees No. 1 in sec. 14 topped the schist at 2258 ft. and continues to drill ahead in this body at 2650 ft.

H. H. Magee's latest completion, Brown No. 5, flowed 2500 barrels of 20.1 gravity oil a day through a 1-in. orifice from a total depth of 2700 ft.

Kettleman Hills Try Making Hole

On the Middle Dome of Kettleman Hills, Standard Oil Co. continues to drill steadily ahead at 9048 feet in well No. 73-30V in sec. 30-22s-19e, Kings County. Present formation is hard shale, with the Vaqueros zone anticipated in the next hundred feet, more or less. Bolsa Chica shares interest in the test under a unitized operational plan.

Wilshire Enters Belridge Sector

West of the Belridge field, Wilshire Oil Co. has staked location for Lehman No. 1 wildcat test, approximately 150 ft. south and 200 ft. east of the northwest corner of sec. 16-28s-20e.

Paloma Development Proceeds Normally

According to a roundup of Paloma operations, General Petroleum Corp. has staked a location for Benco No. 78-28 in sec. 28-31s-26e, and Superior for Houchin No. 18-27 in sec. 27. Superior's Anderson No. 18-35 in sec. 35 is drilling at 9758 ft. in hard shale.

Hogan Petroleum Co., Symons-Two No. 27-7 in sec. 7-32s-27e is preparing to pull liner, after swabbing to 9400 ft. showed no fluid rise. Lloyd Corp., Houchin No. 63-23 in sec. 34 is drilling at 10,652 ft. in shale.

Western Gulf is about ready to give the finishing touches to Paloma Unit No. 81-33 and No. 32-33, located in sec. 33. No. 85-34 in sec. 34 is standing with 7-in. casing cemented at 11,134 ft. Paloma sand was topped at 11,163 ft.

Buttonwillow "Cat" Coring at 3563 Ft.

Three miles south of the Buttonwillow gas field, Transcal Drilling Co. is coring its No. 1 wildcat in sec. 30-28s-23e at 3563 ft. Gus Pongratz is in charge of drilling.

Bacon Hills Try Still Fishing

Bandini Petroleum Corp., Bacon No. 1 in sec. 27-28s-20e, which has been beset with a number of mechanical difficulties for weeks, has recovered all but one single of its fish. Total depth is 11,011 ft., with plug at 10,900 ft.

Petrol Drills On Raisin City Well

Petrol Corp. is drilling No. 1-22 wildcat in sec. 22-15s-19e in the Raisin City area at 4190 feet, following a run of electric log to 4100 ft. Ditch showings were noted at 4030 ft.

Old River Try Coring Ahead

In the Old River area of Kern County, Shell Oil Co., Inc. is coring K. C. L. No. 45-16 in sec. 16-31s-26e at 10,631 ft. Recovery on a formation trial between 10,562 and 10,626 ft. was composed of a small amount of mud and drilling water. The top of oil showings in the Stevens zone were placed at 10,562 ft.

Cymric Area In Limelight

Independent Exploration Co.'s second well in the Cymric area, Cymric No. 1 in sec. 21-29s-21e, is making hole normally ahead at 3887 ft. in brown shale. Etchegoin oil sand was logged from 2808 to 2850 ft.

Southeast of the Independent-Oceanic No. 1 producer, Honolulu Oil Corp. is drilling No. 47 in sec. 22 at 3521 ft. in brown shale. No. 56 in the same section has started to drill and now has 11¾-in. surface casing cemented at 211 ft.

Superior Oil Co. is preparing to formation test basal Etchegoin sand in the interval of 3405-3435 ft. in Woody No. 57-22 in sec. 22. Present depth is 3445 ft. in brown shale.

Victory Oil Co., owner of several comparatively shallow producers on the property on which Union Oil Co. made a deep zone discovery some months ago, is understood as making plans for three drilling jobs in sec. 26. The ground involved is owned by Victory Oil.

Union Avenue Well Rigs Pump

Hancock Oil Co. is installing pumping unit on K.C.L. No. 1 in sec. 6-30s-26e at Union Avenue, which flowed at a 100-barrel a day rate, cutting 2 per cent, before it died. The casing is perforated at intervals from 4915 to 5305 ft. Total depth is 5346 ft.

Pyramid Hills Core Hole Begins

Near a group of relatively shallow producing wells owned by Standard Oil Co., F. S. & D. Oil Co. has commenced operations in its Core Hole No. 2 in sec. 8-24s-18e in the Pyramid Hills of Kings County. Present depth is slightly below 650 ft.

Core Hole No. 1 was last reported bailing. Total depth is 905 ft., with casing set at 811 ft.

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New Grapevine Drill Program

Reserve Oil & Gas Co. is making ready to bore three more wells in the Grapevine-Tejon area of Kern County. Tejon No. 11-33 is building derrick in sec. 33-11n-19w. No. 12-33 in sec. 33 is but a foundation to date, and No. 13-33 in the same section is yet a location.

The latest completion in the area was effected by Richfield Oil Corp. It was Tejon No. 68-35 in sec. 33, which pumped 18.2 gravity oil at the rate of 108 barrels a day.

Drilling & Production Co. has spudded O.M.B. No. 27 in sec. 33.

Ring Brothers Grade Poso Site

George W. and Frank L. Ring, early day drillers at Santa Fe Springs and Signal Hill, are continuing their development work in San Joaquin Valley by grading location for B. N. B. No. 9 in sec. 32-26s-28e at Mount Poso. In the meantime, B. N. B. No. 8 is bailing after going to 1728 ft. in oil sand and setting 7-in. casing at 1695 ft.

Jacalitos Try Cements Pipe

Standard Oil Co., Reay No. 58 in sec. 22-21s-15e in the Jacalitos area of Fresno County is standing with 7-in. casing cemented at 3865 ft. The hole was carried to a total depth of 4075 ft., and subsequently plugged to 3950 ft. A formation test at 3963-4075 ft. recovered 2790 ft. of fluid grading from mud to salt water.

The company's No. 63-35E in sec. 35 is running a formation tester after coring to 5731 ft.

Kern River Test Grades

Tide Water Associated Oil Co. is grading drill site for Luck No. 54, some 330 feet north and a like distance east from the center of sec. 30-28s-28w in the Kern River area. It is designed as a deep test to basement. In sec. 27, Ray Frampton has foundation in for Frampton No. 6.

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New Wildcat At Reef Ridge

Approximately 7 miles southwest of Kettleman Hills North Dome, Kings Exploration Co. is building derrick for Avenal No. 1 wildcat test located in sec. 18-23s-17e, Kings County. The leasehold embraces more than 700 acres.

Coastal and Northern District

New Rio Vista Well Seems Sure

Standard Oil Co.'s Terchuren No. M-5 in sec. 34-4n-3e in the Rio Vista, which is surrounded by an auera of promise, is running casing, after being cored to 4635 ft.

On a formation test of 4584-4604 ft., the well flowed at a 10,940 MCF rate through a ¾-in. bean. Test of 4604-4615 ft. flowed at 6,110 MCF rate through a ¼-in. orifice.

New Wildcat Well For Glenn County

Approximately 12 miles southeast of Willows in Glenn County, General Petroleum Corp. is grading roads for Norman No. 1, a wildcat test, in sec. 5-18n-1w.

Eureka Canyon Well Tests Upper Showings

El Rika Oil Co. has taken over the abandoned Standard Oil Co., Stevens-Eureka No. 1 in sec. 33-4n-18w in the Eureka Canyon field of Ventura County, with the intention of testing above 3000 ft. Total depth is 8220 ft.

El Rika's location for El Rika No. 1 in the section, probably will not be drilled.

Tehama County Try Rigging Up

In the Paskenta area of Tehama County, Northern Oil & Gas Co. is rigging derrick to start the drill in Tiger No. 1 in sec. 1-23n-7w.

Liberty Farms Test Making Hole Ahead

Approximately four miles south of Amerada Petroleum Corp.'s Wineman No. 1 discovery well in the Maine Prairie area, the Barnsdall-Honolulu combination is drilling Liberty Farms No. 2 in sec. 12-5n-2e at 5001 ft. in shale. Nothing of evident interest has been picked up to date.

Santa Maria Well Pumping

Bel Air Oil Co. has finished its Giacomini No. 3 in sec. 24-10n-35w at Santa Maria Valley pumping 190 barrels of 15 gravity oil a day, cutting 4 per cent. Total depth is 5251 ft., with 7-in. set at 4401 ft.

In sec. 21, C. E. O'Donnell is drilling at 4150 feet in Grace No. 1. The drill has been in Knoxville sandstone since 4000 ft.

General Petroleum Corp.'s Defense No. 1, which was recently acquired from the Pacific Central Oil Co., has reached a depth of 4713 ft. in the Knoxville zone. Located in sec. 20, General took the well over at 4336 ft.

Torrey Canyon Well Rigging Up

Oceanic Oil Co., which made a sensational oil strike at Cymric several weeks ago, is rigging rotary to start the drill in its Hunter No. 1 wildcat in sec. 32-4n-18w in the Torrey Canyon area of Ventura County.

Carpinteria Well Prospecting Ahead

On the marshland between Carpinteria and Summerland, Western Gulf is drilling ahead in Bryce No. 1 in sec. 30-4n-25w below 300 ft. Previous wildcat ventures in the area were carried to depths far from conclusive.

Coastal Quartette Still Stands Idle

Four wildcat tests in as many different prospective sectors of Ventura County continue to stand idle.

Delaney Petroleum Corp., Victory No. 1 in sec. 8-4n-21w in the Ojai area is idle at 3551 ft.; Firestone Oil Co., O'Leary No. 1 in sec. 29-4n-20w in the Fillmore area, at 412 ft.; J. P. Oil Co., Murray No. 1 in sec. 23-1s-20w in the Malibu area, at 3060 ft.; and Andrew and Mabel E. Lucas, Janet No. 1 in sec. 7-1n-21w in the Oxnard area, at 2750 ft.

Los Alamos Try In Gray Shale

Los Alamos No. 2, being drilled under the sponsorship of General Petroleum Corp. in sec. 31-8n-33w in the Lompoc area of Santa Barbara County, is now drilling in gray shale at 4160 ft. On a formation trial of the interval of 3938-4122 ft. recovery was gassy mud along with about 5 per cent oil.

Ventura Avenue Adds Producers

New well completions in the Ventura Avenue field include British-American Oil Prod. Co., Hartman No. 14 at 11,100 ft., flowing 410 barrels of oil and 241 MCF of gas; and Shell Oil Co., Inc., Taylor No. 205 at 8140 ft., flowing 444 barrels and 622 MCF a day. Taylor No. 229 is about to be given the finishing touches at a plugged depth of 8140 ft.

Lloyd Corp., L. C. No. 16 is yet a foundation. L. C. No. 18 is drilling at 8606 ft. The 11¾-in. casing was set at 1686 ft.

Modelo Well Reruns Tester

Pacific Western Oil Corp.'s Crocker Fee No. 1-D in the Modelo field of Ventura County, which started off for a thorough look at possible deep pays, is ready to rerun tester for the second time as a sequel to packer failure on attempted trial of the interval of 7930-8000 ft.

The well is located in sec. 7-4n-18w and was carried to a total depth of 10,504 ft., before plugging back to 8430 ft., due to apparent insurmountable mechanical troubles.

Ojai Project Cleaning Out

Volunteer Petroleum Corp. is cleaning out Hilltop No. 2 in sec. 7-4n-21w at Ojai, after landing 2255 ft of 4½-in liner, including 1065 ft. of perforated at 5203 ft. and cemented through perforations at 4133 ft. Hole is bottomed at 5211 ft.

Trans-Cal. Gas & Oil Corp. has cellar in for Byhara No. 2 in sec. 12-4n-22w.

Red Mountain Test Sets Surface Pipe

In the Red Mountain sector, Continental Oil Co. has set surface pipe at a depth of 538 ft. in its Casitas test in sec. 7-3n-23w, and it is

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standing cemented. While making hole in surface formations circulation was lost near 65 ft.

Standard Duo Drilling On

Standard Oil Co., Santa Paula Unit No. 1 in sec. 10-4n-20w near Santa Paula is drilling ahead at 8749 ft., after recovering the fish which held up normal operations for some weeks.

In the Timber Canyon area, Andrews-Toland Comm. No. 1 in sec. 18 is making progress with the drill in shale at 4325 ft.

Hopper Creek Try Drills Below 2300 Ft.

Union Oil Co. was last reported making satisfactory headway at a depth of 2335 ft. in its Moran No. 1 wildcat in sec. 1-4n-19 in the Hopper Creek area. At present depth the bit is in shale.

In the Simi area, four miles northeast of Simi, Simi No. 6 in sec. 17-3n-17w has reached a depth of 2912 ft. and now is the subject of a survey by electric log.

Arroyo Grande Well Starting

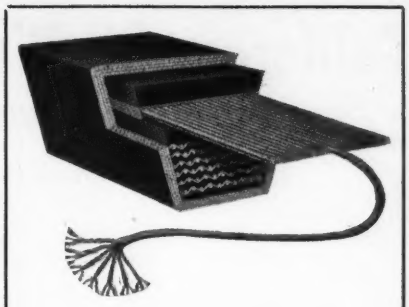
Southern California Pet. Corp. is preparing to start the drill in Dollie No. 4 in the Arroyo Grande field in San Luis Obispo County in sec. 6-32s-13e. Drill site is on property recently purchased from the Dollie Adams Oil Co. of San Luis Obispo.

New Advertising Agency Formed

The firm of Moore & Schacht, Distribution Engineers, have opened offices at 1501 So. Grand Ave., Los Angeles 15.

Distribution services offered include market research and analysis, creative advertising, and sales promotion.

Principals in the company are A. W. Moore, formerly Advertising Manager and Market Research Director of Fairbanks, Morse & Co., Turbine Pump Division, and Herman Schacht, formerly Advertising and Sales Promotion Manager of General Controls Co.



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California Oil World's Monthly Summary

DEVELOPMENT—PRODUCTION—SUPPLY & DEMAND
PACIFIC COAST TERRITORY
TABLE I—CALIFORNIA DEVELOPMENT—PRODUCTION

	SEPTEMBER, 1945 DEVELOPMENT				PRODUCTION	
	Active Drilling Wells	Oil Wells Completed	Initial Production B/D	Oil Wells Completed First 9 Months	Daily Average Sept. 1945	Daily Average Sept. 1944
SAN JOAQUIN VALLEY						
Ant Hill	3	.....	.....	10	595	61
Antelope Hills	1	1	19	4	1,711	2,208
Antelope Plains	.....	.....	.....	.....	.....	39
Arvin	.....	.....	.....	.....	58	37
Bellevue	.....	.....	.....	.....	667	815
Belridge—North	3	1	6	4	5,883	7,168
Belridge—South	2	6	190	100	12,338	11,225
Blackwell's Corner	.....	.....	.....	6	157	324
Brundage	.....	.....	.....	.....	.....	.....
Buena Vista Hills	6	5	725	130	45,090	23,463
Burrel	.....	.....	.....	.....	16	25
Canal	.....	.....	.....	.....	3,552	3,584
Canfield-Gosford	.....	.....	.....	1	206	.....
Canfield Ranch	.....	.....	.....	.....	26	37
Coalinga—East	5	6	759	39	18,325	22,599
Coalinga—Nose	.....	1	409	2	55,397	69,875
Coalinga—West	1	2	74	17	7,758	7,731
Coles Levee—North	1	.....	.....	7	19,694	
Coles Levee—South	1	1	168	7	2,292	18,023
Dyer Creek	.....	.....	.....	.....	.....	.....
Edison	6	5	1,805	28	7,173	3,262
Elk Hills	6	1	10	205	14,730	21,461
Fruitvale	1	.....	.....	8	8,396	8,654
Greeley	3	.....	.....	8	14,311	14,680
Helm	6	.....	.....	14	3,485	1,621
Jacalitos	3	1	135	23	3,671	792
Kern Front	2	5	319	32	12,721	14,305
Kern River	1	1	5	24	9,661	9,809
Kettleman North Dome	8	1	770	14	38,531	41,535
Lanare	2	2	446	7	835	124
Lost Hills	1	.....	.....	6	3,247	3,338
McClung	.....	.....	.....	.....	30	62
McKittrick	4	5	849	21	5,965	5,217
Midway-Sunset	2	5	195	45	39,029	41,833
Mountain View	1	.....	.....	2	2,860	3,242
Mount Poso	2	.....	.....	20	17,995	21,068
Paloma	7	2	1,520	12	3,073	6,712†
Pleasant Valley	1	.....	.....	4	3,615	3,541
Pyramid Hills	1	.....	.....	8	341	193
Race Track	2	2	888	8	1,138	60
Raisin City	1	.....	.....	6	3,196	3,082
Rio Bravo	.....	.....	.....	.....	16,157	16,788
Riverdale	.....	.....	.....	7	4,002	5,064
Rosedale Ranch	2	.....	.....	1	129	.....
Round Mountain	2	2	179	22	9,786	10,142
Santiago	3	1	1,020	2	476	.....
Sheep Springs	.....	.....	.....	3	598	89
Strand—East	.....	.....	.....	1	639	651
Strand—West	.....	.....	.....	.....	1,581	1,777
Tejon	.....	.....	.....	10	607	147
Ten Section	.....	.....	.....	.....	10,096	12,847
Union Avenue	1	.....	.....	.....	159	91
Wasco	.....	.....	.....	.....	1,078	1,938
Wheeler Ridge	.....	.....	.....	.....	236	251
Miscellaneous	2	.....	.....	.....	36	.....
TOTAL SAN JOAQUIN VALLEY	93	56	10,491	868	413,348	421,592
COASTAL AREA						
Aliso Canyon	1	1	749	6	3,303	3,657
Bradley Canyon	.....	.....	.....	.....	31	13
Capitan	3	1	456	4	2,312	2,580
Del Valle	1	.....	.....	2	2,526	2,016
Elwood	1	.....	.....	4	5,893	5,810
Gato Ridge	.....	.....	.....	6	4,323	5,319
Hasley Canyon	.....	.....	.....	.....	.....	.....
Newhall-Potrero	.....	.....	.....	5	5,426	5,198
Oak Canyon	2	.....	.....	4	1,907	1,316
Oxnard	1	.....	.....	1	1,271	1,281

	SEPTEMBER, 1945 DEVELOPMENT				PRODUCTION	
MONTHLY SUMMARY—Continued	Active Drilling Wells	Oil Wells Completed	Initial Production B/D	Oil Wells Completed First 9 Months	Daily Average Sept. 1945	Daily Average Sept. 1944
Padre Canyon	1	1	270	3	2,098	1,822
Ramona	2	2	450	5	331	.....
Rincon	4	1	127	11	4,570	4,470
San Martinez	1	1	432	6	3,906	2,686
San Miguelito	1	1	258	4	5,092	5,777
Santa Barbara	.....	.....	.....	.....	88	86
Santa Maria	4	2	501	8	14,181	14,388
Santa Maria Valley	7	9	1,226	65	37,714	34,320
Summerland	.....	.....	.....	.....	.....	4
Ventura Avenue	10	3	1,781	37	46,142	51,802
Ventura-Newhall	11	5	672	36	5,637	5,442
Watsonville	.....	.....	.....	.....	25	25
Zaca Creek	.....	.....	.....	.....	239	.....
TOTAL COASTAL DISTRICT	50	27	6,922	207	147,015	148,012
LOS ANGELES BASIN						
Brea-Olinda	.....	.....	.....	1	11,273	11,933
Buena Park	.....	.....	.....	.....	91	119
Coyote—East	1	.....	.....	5	5,034	5,473
Coyote—West	4	3	1,024	18	15,764	12,375
Dominguez	2	.....	.....	7	18,451	21,151
El Segundo	.....	.....	.....	.....	796	1,024
Huntington Beach	4	4	241	42	47,297	49,233
Inglewood	.....	.....	.....	1	15,134	17,325
Lawndale	.....	.....	.....	.....	19	29
Long Beach	1	.....	.....	1	26,493	29,114
Los Angeles-Salt Lake	.....	.....	.....	.....	488	518
Montebello	2	1	122	6	9,797	10,704
Newport-Costa Mesa	5	9	948	33	2,074	10
Playa Del Rey	.....	.....	.....	.....	2,415	2,762
Potrero	.....	.....	.....	1	1,061	1,042
Richfield	4	.....	.....	9	7,516	7,137
Rosecrans	.....	.....	.....	6	5,577	6,088
Sansinena	.....	1	102	2	116	.....
Santa Fe Springs	.....	.....	.....	1	16,887	18,363
Seal Beach	3	.....	.....	12	9,589	8,289
Torrance	3	2	73	37	8,776	8,793
Turnbull Canyon	.....	.....	.....	.....	165	211
Whittier	.....	.....	.....	3	1,001	1,043
Wilmington	14	13	2,143	103	100,182	104,610
Yorba Linda	.....	.....	.....	.....	10	773
TOTAL LOS ANGELES BASIN	43	33	4,653	288	306,006	318,119
EXPLORATORY						
Outpost Wells	22	.....	.....	.....	.....	.....
Wildcats	30	.....	.....	.....	.....	.....
Gas Wells	3	4	.....	43	.....	.....
TOTAL CALIFORNIA	241	120	22,066	1,708*	866,369	887,723

*—Includes gas wells completed and 302 drilling wells abandoned.
†—Includes cycle condensate.

TABLE II—SUPPLY AND DEMAND FOR PETROLEUM PRODUCTS
PACIFIC COAST TERRITORY
DATA FOR SEPTEMBER OF EACH YEAR

	Sept. 1940	Sept. 1941	Sept. 1942	Sept. 1943	Sept. 1944	Sept. 1945
RAW MATERIAL—B/D						
1. Crude Oil Produced—California	612,000	646,771	726,401	780,790	887,723	866,369
2. Crude Oil from outside 5 Western States	1,933	2,629	3,832	5,277	4,710	5,231
3. Natural Gasoline Produced	38,000	39,000	37,000	40,000	43,000	44,000
SUPPLY OF FINISHED PRODUCTS ALL SOURCES—B/D						
4. Natural Gas., L.P.G. & Condensate	7,600	3,233	5,466	5,233	9,900	9,067
5. Gasoline and Naphtha Distillates	226,500	256,034	258,300	266,834	327,100	333,333
6. Kerosene and Kerosene Distillates	7,767	4,734	5,933	8,633	9,367	4,867
7. Lubricating Oils, etc.	14,700	10,033	11,666	7,700	10,667	15,733
8. Gas Oil and Diesel Oil	85,300	66,633	74,200	61,000	71,067	60,466
9. Fuel Oil Residuum	245,933	288,400	393,133	440,000	421,567	443,233
10. Asphalt and Road Oils	27,599	35,433	45,500	29,200	34,667	26,967
11. Coke and Other Finished Products	1,367	4,733	1,167	500	2,666	2,767
12. Other Unfinished Oils	(567)	(2,865)	(1,433)	(10,167)	(2,567)	(767)
13. Refinery Shortage and Gas	22,467	25,033	31,168	38,268	49,400	41,133
14. Crude Oil (Net)	20,067	5,367	(46,734)	(3,366)	31,066	6,933
15. TOTAL SUPPLY	**658,733**	**696,768**	**778,366**	**843,835**	**964,900**	**943,732**
16. TOTAL DEMAND	710,733	703,634	752,967	991,801	901,800	953,899
17. DIFFERENCE	52,000	(6,866)	25,399	(147,966)	63,100	(10,167)
18. Stocks on hand End of each month (Total Bbls.)	155,013,000	142,644,000	131,550,000	114,684,000	92,851,000	76,553,000

Carrington King

(Continued from Page 29)

U. S. representatives who were present at the London negotiations explain that the word-change was made "at the insistence of grammatical purists", who merely thought it sounded better. Furthermore, it would be to the advantage of the American oil industry to have Burma and Kuwait left out, they added.

Proponents of the tidelands resolution are hoping the year 1946 will settle forever the question of State vs. Federal ownership and permit a return to the good old days when the States and their lessees felt secure in their right to the disputed properties.

Although no definite date has been set for the hearings, they are expected to get under way soon after Congress returns for the 1946 session. Ickes will be the principal witness for the opposition, which promises plenty of fireworks.

California's Atty. Gen. Robert W. Kenny, and Assistant Atty. Gen. William W. Clary appear confident that support for the tidelands measure will be substantial in the Senate. Both men have been working on California's presentation in Washington, and are attending the Attorney General's conference at Jacksonville, Fla., Nov. 26. The tidelands issue will be one of the most important on the agenda at the convention.

The tack that California will take is indicated by a statement prepared by Kenny and Clary which reviews the tidelands case: quotes from the House Judiciary Committee hearings which preceded House passage of the bill by a vote of 108-11; comments on the complaint filed by the Justice Department with the U. S. Supreme Court and does considerable speculating on the motives of Secretary Ickes in opposing the legislation and seeking a court decision.

It is this speculation which indicates the new and stiffened position that will be taken by the bill's proponents at the coming hearing. Among the questions asked are: "Why Did Mr. Ickes Change His Mind?" and "Who Are the Opponents of H. J. Res. 225?"

The statement points out that prior to 1936 "neither Mr. Ickes nor any previous Secretary ever countenanced" the practice of filing applications with the Interior Department for oil and gas leases. Such applications were "promptly denied" on grounds that the lands belonged to the sovereign states.

On January 16, 1936, an application for a Federal oil lease on a tract of land lying off Huntington Beach was filed by C. A. Weigel, it is pointed out, and "for the first time such an application was not denied".

Applications from that date "commenced to pour in", according to Kenny and Clary, until there are now 146 undenied applications for lands along the Southern California coast pending in Ickes' office.

Under the heading "If Mr. Ickes Gains Control of Tidelands to Whom Will Federal Tideland Oil Leases Be Issued?", the State officials set forth an interesting exchange of correpondence between Fred W. Johnson, Commissioner

(Continued on Page 54)

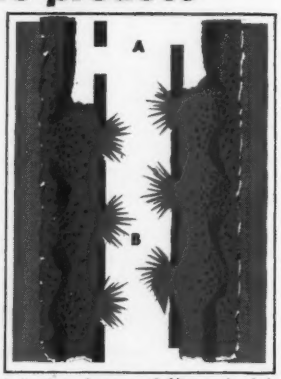
Filter Cake has 2 faces

It's fine when you're drilling . . . but it's the devil and all when you're trying to produce

As you know, one of the reasons for using mud while drilling is to build up a filter cake to protect the formation. Fine! But—if filter cake keeps drilling fluid **out** of the formation, obviously it will hold oil **in** the formation. Not so good, then! (See A.)

That's where a McGaffey-Taylor Pressure Washer comes in. Using the terrific force of **controlled** hydraulic pressure, it drives a powerful jet between close-spaced packers to break up that filter cake and scour the formation clear and clean, to bring in **all** the oil that well will produce. There isn't space here for the full story. To get that,

Write for NEW Well Washing Bulletin, or ask a representative to demonstrate transparent model.



A further danger of filter cake left in the well is shown at B. Oil breaking through a few weak spots in the filter cake travels at relatively high velocity, carrying excessive sand. Perforations are being cut away, the sand body is caving: eventually this pipe will collapse.

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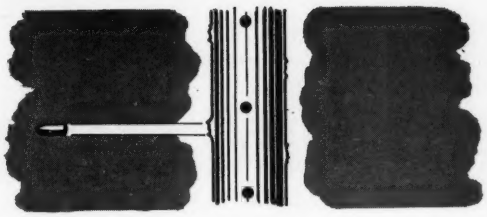
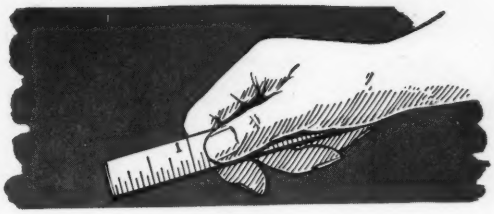


GREATER PENETRATION into the formation. Proved by repeated field tests.



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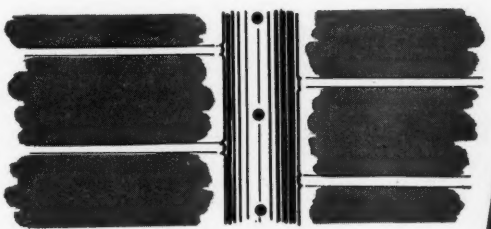
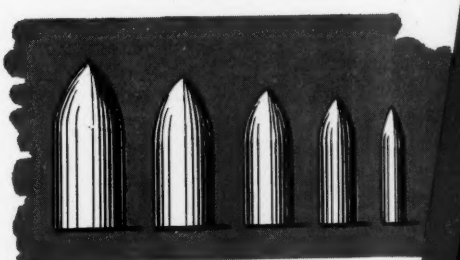


EXACT SPACING — because all shots are fired simultaneously, while the gun is at rest in the desired location.



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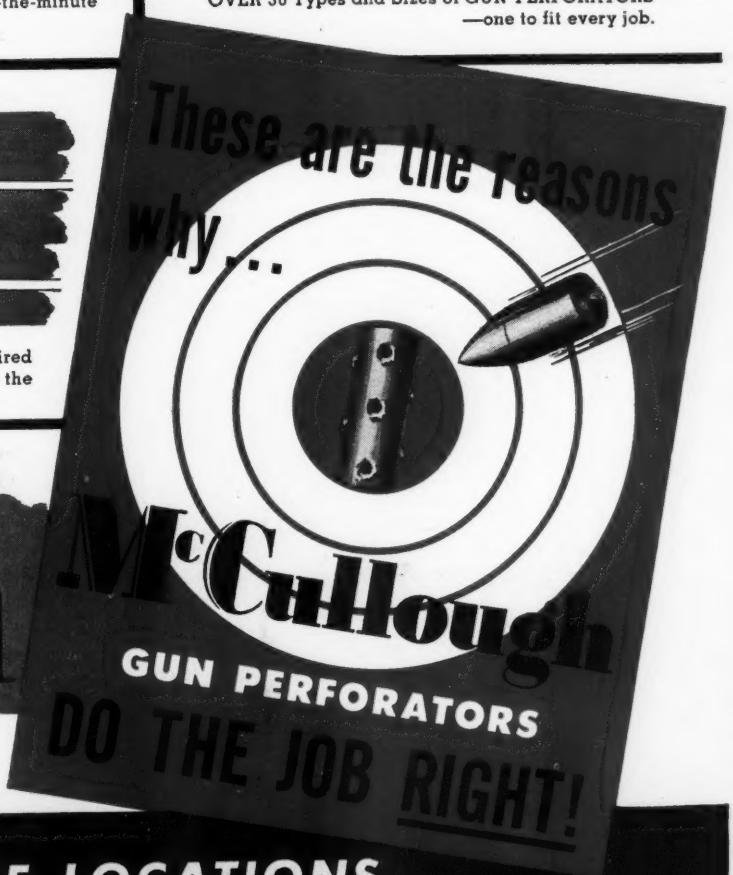

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Kern County OIL NEWS

Only a comparatively small number of buyers was all that was needed to send California oil venture stock up . . . up and up. And that certainly happened to some of the opportunities as a result of "new fields to conquer" in Kern County. In Cymric area the sand they sought was discovered.

If anyone saw petroleumwigs at El Tejon "roundtable" it was because of only two things. Either a new member from Heaven had blessed the presentee, or field orders of a fortnight's duration failed to include time out for A.A.P.G. But at the Ambassador this month few Kernites would wager that even one "petrolwig" from Kern had not been counted present.

For readers' information it seems that Kern which produces only a third of the oil in this great state, was again endowed with delegation enough to equal half of state's production representation for the year, at Hotel Ambassador.

Women and Horses Department. No . . . this column has not devoted any research to such demands and needs. However, Theda Baroid (or was it Theda Bara) was an actress . . . but so was Lakeview in 1910. On the other hand one should not discount the part which "fairer sex" has played in the winning of the war.

Jim Sheller of rich Richfield made shelter to the security of old Kern. To him the A.A.P.G. on Wilshire street just lasted for a day. To oil onlookers table, he was marked "first to return". To hear him talk is worth double the expense account, for he took down every word convention masters had to say, then Jim hurried back to see his new small son, James Robert.

"Strong and Matjesic" of Honolulu fame returned to duties of the desk, and as well as he likes to "trip the light fantastic" he failed to show up at A.A.P.G.'s ball. On Sunday last we found him deep in the heart of his work, while fellow "tecs" were counting up the mileage and taking inventory of what went on".

Glenn Ferguson in '44 was with the Union Oil, but now with an own portfolio a "PRIVATE COUNSELLOR" for petroleum needs. A "paper" which was accredited at recent A.A.P.G. meet brought home the proof that individual effort can be made to invest the oil industry with the progress that it needs. So it is with pride that Kern reports success for its Ferguson who talked of "Paleocene Beds of San Joaquin Valley." Glenn coins a word because one is not certain that particular sections of deposits may represent the "eocene" or a stratum of "cretaceous" or both—sometimes in upper case instead of low and vice versa.

Presiding at almost every session were men of Kern. Jim Kimball was tops and held a steady course the afternoon of Thursday. Then Rollin Eckis took over for the session next day. A paper by Lewis H. Boyd on "gravity results in the areas of Lost Hills and Kettleman," was something also to remember.

Four hundred millions of barrels of oil MORE this year than last are estimates for '45. Kern comes in for more than just a third of that increase, it is reported. Reserves from new wells this year will go to 25 millions, it is predicted by Kernfolks in oil, according to some A.A.P.G. reporters who took down notes.

Southern Cal's natural gas head at Taft for Kern is in the printer's

DATE WITH DAVE FOR DINNER

Dave Roland, the El Tejon's most popular and hardest working Maitre D. No oilwig dines here without Dave who is sponsoring double decked highways over the ridge. George Haberfelde is more serious and talks with Highway Engineers about tunneling from Lebec to Gorman's. A possibility one less than a mile run that saves three miles and a lot of bottlenecks from snow to burning butane busses.

ink again. To him was saddled the chairmanship of Westsides' Victory Loan event. A. B. (Tex.) Newby, who was selected—he is the one always getting things done because he is never "too busy" or indifferent to do a job and a half. "Tex" thinks that only those "too busy" are the folks that have time for anything to do.

Operator "X oil" has been winning on Stanford all year by wagering the Indians will fail to score. That's right . . . Stanford Red had gone to war and the Wacs there can't call signals. Kern petroleum engineers are 90 per cent Stanford, so the "trumor" goes.

Last month's movie news hit Kern. Fibber McGee and Molly near Woody were telegrammed in haste that "rancho fibber" was in flames. The avalanche of news at this week's end had failed to reach its prime, but Kern was topflight column copy.

To Denver this month went Kern Reclamationists, ostensibly to see that 900 cars would use more gas to reach the session on location in Kern when next the opportunity affords.

Gasmen will be encouraged to keep up franchises at Kernport, as Artie Shaw stopped his plane to "filler-up." Enroute to the metropolis Burbank fogged him back to await rescue from instrument-minded pilots. Ava Gardner was along and almost waited at the church. Artie Shaw was flying to get married.

Lt. Paul McGovney, geologist and hunting partner of "in-the-news" Jim Shelter from Richfield. Paul is being sorted out for his return to good old Honolulu Oil at army's first opportunity. Paul's

WESTERN OILFIELDS SUPPLY CO.

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been in Burma all this time.

Bill Rath, who claims 2-B (native) Illinois, has left the Texaco to join with British-American.

Tommy Boles has been assigned to Findlay, Ohio, to be placed in charge of "gravity" work in that mid-area.

To Los Angeles now went Jim Kimball for district geology for General Petroleum. To "beau brummel" Kimball, this column's hearty good wishes.

Richfield's thirteen geologists are hunting for one more member of the clan to enrich Richfield's good luck in case 13 may bring less lucky exploration.

What Concrete Pipe has to do with oilmen's tubular steel is not exactly known, but many an oilwell supplywig this month congratulated Gibson at Delano, long known a friend to oilmen and agriculturalist.

For many a year a resident of Taft, Ray Antunez now gets his mail at Vernon, California. As storekeeper for "GP" he is second in authority over all the General Petroleum warehouses. Joseph Keefer holds down Ray's place at Taft, but for himself.

HOME OF THE WESTERN OILFIELDS SUPPLY COMPANY
Strategically located for postwar freeways designed by the California State Highway Commission Department of Public Works, Charles P. Lake, general manager is sitting pretty on U. S. Highway 99, the Golden State Highway, which is intersected at this point by Pierce Road's Contractor's Row, and places "WOSCO" right at the northeast turn of the new proposed traffic circle at that point.

In 1925 the drilling of eight new wells on the west front of Kern River Oil Fields, and the punching of 16 more on the southern shores of Lake Buena Vista constituted a hot news item, according to the files of a local newspaper when it reviewed the activities of "twenty years ago".

Fifty years ago new uses found for oil had jubilated Kern when certain stoves for heating had a complete sell-out by 9 a.m. on the day following the advertisement of

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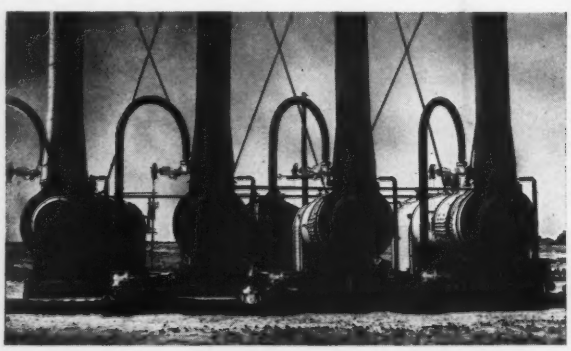

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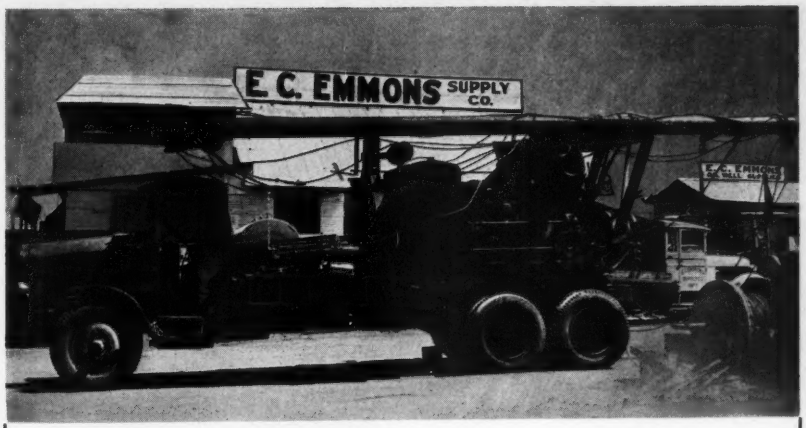
same. This month Kern Automobile dealers helped organize plans to receive new cars which will probably have a similar experience and inadvertently increase the demand for oil in a more refined state.

Angus J. Crites of Maricopa has been elected vice president of the California area of I.P.A.A. as a result of the Tulsa annual conference. Only other Californian elected was L. L. Aubert as a member of the executive committee.

Credit where credit is due. Gladys Buckley is now chief draftsman at the Honolulu in Bakersfield. Her many friends have taken time out to report her rapid advance with the firm and congratulations are in order for a job "well done" during the war when such an assignment to geological and petroleum engineer offices went begging for a long, long time. Draftswomen are proving to be better detailers than draftsmen, it is reported. Not so long ago all secretaries and typists were male, but the day of "he" stenographers are over. Maybe this is a warning to patientless draftsmen, too. One never knows.

To this department last month came a never-to-be forgotten phone call. From the crippled children's facility at Kern County's big general hospital, the little chap that called reported that he had wheeled himself out into a ward phone for the purpose of verifying the loss of his one best friend, William (Billy) Schultz. W. J. Schultz to him was a nine year memory and he was more than saddened by your scribe's confirmation that Billy Schultz had recently passed away. This brought to mind that column K.C.O.N. had inadvertently omitted mentioning the demise of Kern's most beloved oilman, William J. Schultz. To his widow your scribe acknowledges regret and tenders his sympathy, and to his many, many friends apologies for a gross oversight.

A name to remember is Larkie Flatt with Western Oilfields Supply. Flatt is now field production manager and business extension consultant. Formerly of Coalinga, he knows the oil game and is grateful to be back from an extended sea voyage with Uncle Sam's navy, where he served as an officer in a senior capacity. Kern welcomes Lt.



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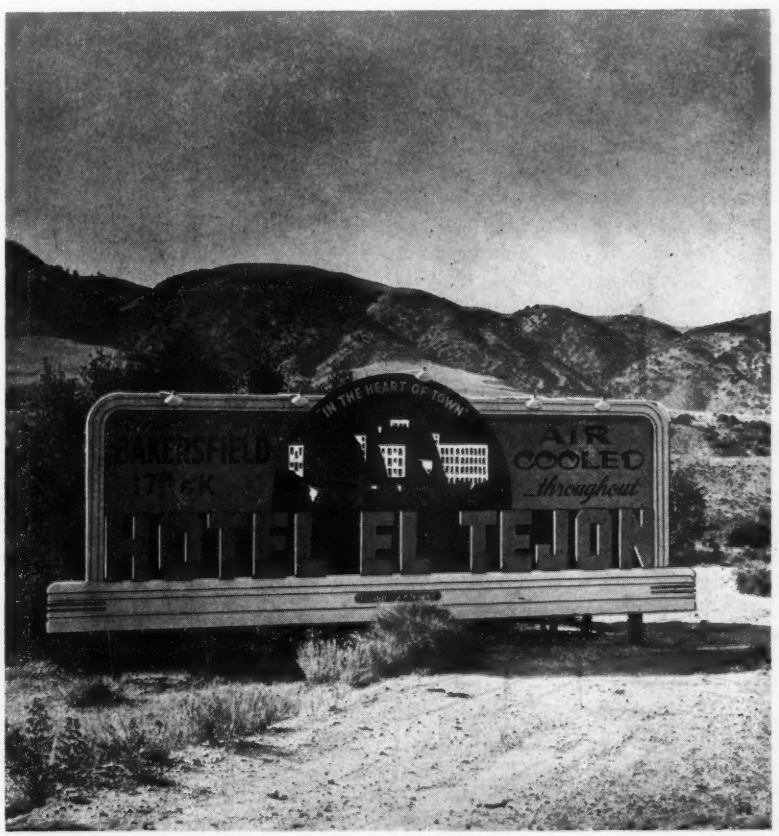

Commander Flatt and tenders unlimited good wishes for a self imposed delayed residence. By the by his first question to all contacts is not a saluation but a greeting in which the sentence of his acknowledgment should end with a question mark . . . "Hello, have you a house for rent?"

By last week's end it was common belief that postwar prosperity like prewar depression is either the first or last to hit out here . . . and it could well be that neither of them, like the "good old" days could even go out to happen . . . as an accident to prosperity. Kern is recorded as a place that is three years behind and ahead both of any economic innovations.

At last Kern oilmen all agree that oil prosperity here, come what may is collateral for assured hopes for increasing returns at least for three more years.

At North Belridge and with Standard Oil since 1904 last month as assistant superintendent of San Joaquin Valley production, Francis Marion Watkins died.

For Fellows California last month, and friends everywhere came sad news with the announcement of the passing of Claude A. Brand. With California Midway for a quarter of a century, he was identified in more recent years as with the C.C.M.O.

"Kern Oil News" dislikes to see the passing of so many milestones along the way that saddens the good people of this county.

Kelite National Director Completes Survey Trip

Harry L. Smith, National Director of Kelite Products, Inc., Los Angeles firm manufacturing industrial cleaning compounds, returned recently from a six weeks' reconnaissance trip through the country. The purpose of this 7200 mile trip was to check on post-war factors important to the cleaning compound industry.

High on the list of importance was the organization shift that added 5 states to the Kelite Southwest Division and 2½ states to the Midwest group that has headquarters in Chicago. This move provides more complete distribution and efficient sales service to meet the expected post-war expansion. It also lays a solid foundation upon which to build this greater national representation.

In addition to this, such points as new materials, warehousing and general organizational expansion were discussed in the meeting with Kelite groups in Salt Lake City, Denver, Kansas City, St. Louis, Memphis, Tulsa, Oklahoma City, New Orleans, Houston, Fort Worth, El Paso, Phoenix, and Dallas.

Mr. Smith was gratified by the optimistic views and expressions of confidence which he observed throughout his trip. He returned with a conviction that the new methods of controlled cleaning based on pH were finding universal acceptance as the prime force in guiding cleaning operations in any industry.

RELAXING IS NEWS FOR KERN OIL MEN
Judge W. C. Robertson of McKittrick and friends. Constable Jerry Leake and son Junior just out of the service. Said Judge Robertson, relaxing in front of El Tejon's big fireplace, "It's getting more difficult every day for an independent oil producer to even relax and talk business."

Harry L. Smith

Kemnitzer Returns to Private Practice

After two years and a half in military service Luis E. Kemnitzer has resumed his practice as consulting geologist at his former offices at 704 South Spring Street, Los Angeles. Mr. Kemnitzer was Economics, Trade and Industry officer in Military Government and served in this capacity in England, France and Germany. His last assignment was with the regional military Government detachment for Bavaria with headquarters in Munich.

His associate, L. W. Richards, has carried on the consulting work during the period that Kemnitzer was in the army.

BUY VICTORY BONDS

Petroleum in the Post War Years

By DR. GUSTAV EGLOFF
Universal Oil Products Company

Petroleum in the Post War Years..

For many industries, the end of the war brought a serious letdown because the products they made are unsuitable for civilian use. Petroleum is in a much more favorable position. The world is waiting eagerly for enormous volumes of the products which only crude oil can supply.

During the war, production of American crude oil was increased from 3,800,000 to over 5,000,000 barrels per day. Output of 100 octane gasoline was raised from 50,000 to more than 500,000 barrels per day.

Passenger transport planes span the Atlantic and the Pacific at more than 300 miles an hour, and the transport of merchandise is increasing rapidly. Jet propelled planes now exceed 600 miles per hour. The gas turbine power plants also use petroleum fuel. Rockets will transport mail and peacetime goods across the Atlantic in a matter of minutes.

The war opened new vistas of opportunity to oil refiners. The future, though challenging, is full of promise and management faces that future with complete confidence. This is evidenced by the announced intention of many oil companies to improve their plants and enlarge research organizations in order to meet the challenge. Hundreds of millions of dollars are earmarked to finance extension of facilities including the building and equipping of most modern research and development laboratories.

The war increased appreciation of the value of research and gave it an impetus which brought developments in the four years since Pearl Harbor which could hardly have been expected in two decades at normal peacetime tempo.

Spurred by the harsh needs of war, new discoveries were made. Processes were speeded to commercial operation which for years had lain dormant in chemical reports because they were not economically feasible at the time. War swept aside economic barriers. Crude oil was revealed as a vertible treasure house, a source from which over 500,000 of all the known organic chemicals can be produced.

The peoples of the world will be the richer for these discoveries and developments, which are rapidly being adapted to civilian needs.

The first benefit will come in improved aviation and motor fuels. The great capacity for 100 octane gasoline production which peace set free for civilian supply will make this super fuel available in quantity sufficient to meet all demands resulting from the expected expansion of transportation, while at the same time permitting great improvement in the quality of automobile gasoline.

In the field of lubricants, too, great strides have been made to meet the extreme conditions of war operations on all fronts in varying climates. While the improved fuels can be expected to give increased speed and economy to airplanes and motor cars, better lubricants will prolong mechanical life by reducing friction under all service conditions.

Motor fuels and lubricants are far from the only products to come from tomorrow's American refining industry. Among the refiners' possibilities are a whole line of products which before the war never were thought of as derivatives of petroleum.

Petroleum can supply the tires upon which automotive vehicles travel as well as the fuel that drives and the oil which lubricates them—tires that may be expected to outlive the car with a mileage of over 100,000. Some 25,000 different synthetic rubbers have been developed, more than 500 of which go into commercial use.

The oil industry can more than produce the world's needs of synthetic rubber, of over 1,500,000 tons yearly, at a price level highly competitive with natural rubber, and use less than one per cent of crude oil production.

Petroleum derivatives of today and tomorrow include medicinals, fertilizers, insecticides, dyes, alcohols, plastics, plant growth stimulators and fruit ripeners, D.D.T., etc.

The products from petroleum are adding markedly to man's enjoyment of living and to his span of life.

Bob Roberts Ends Vacation

H. H. (Bob) Roberts, public relations expert for Standard of California in the Southland, has returned to his Los Angeles office after a vacation of one week, his first respite from duties this year. He plans another seven-day surcease before the end of the year.

When Bob returned, Mary Francis Wing, his proficient and gracious secretary, departed on a vacation of two weeks.

DeWitt Visits Palm Springs

Palm Springs, more and more a mecca for members of the California petroleum industry, was visited recently by Ashley DeWitt, oil producer and contractor-driller, and Mrs. DeWitt, who have an especial love for desert country. They wend their way to the famous spa several times a year.

Betty Lord Bride-Elect

The engagement of Betty Lord, daughter of Clifford Lord, prominent oil producer, to Tech. Sgt. Walter Leonard Bergquitz, U. S. Army, has been announced.

The bride-elect, a Red Cross staff assistant, met her fiance when both were serving in the Persian Gulf command. He is with the Army supply corps and has been overseas for three years. The wedding plans await his return.

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Junior A I M E November Meeting Southern California Section

Mr. Cory began the prepared program by defining terms. A zone is a section or interval which is produced as a unit. A multiple-zone well is a well in which production from two or more zones can be controlled separately. A combination-zone well is a well in which two or more zones are open to production in the same bore hole. Advantages of multiple-zone completions are: the possibility of securing a double allotment, saving in surface space and possibility selecting production from a zone of high gravity or low gas-oil ratio thereby increasing revenue. Since a two-zone well on the average costs 40% less than two single-zone wells, there is considerable saving in first cost provided a multiple allotment is secured. Disadvantages of multiple-zone completions are: the complexity of casing packers, etc. necessary to control production from the separate zones, high maintenance expense resulting from packers becoming sanded or from inner casing strings being sand cut so that there is free circulation between the zones. As a rule, all of the zones of a multiple-zone well must be able to flow since it is mechanically difficult and expensive to pump the zones separately and simultaneously. If possible, single-zone or combination-zone wells would be chosen in preference to a multiple-zone well.

Combination-zone wells were discussed by Mr. Abadie. In the Kettleman Hills Field where drilling costs are high, it is necessary to take many feet of sand in order to make the wells pay out; therefore, as many as five zones are open to production in a single well. Since each of the zones at Kettleman Hills has an individual gas cap and water table, a producing well may be flooded by water or may produce at high gas-oil ratios as a result of being open to more than one zone. If blank sections are CP'd in the liner, the control of interzonal transfer of fluids—either water, gas, or oil—is easier.

Multiple-zone completions at Wilmington were discussed by Mr. Winterburn. Operators chose to complete wells in two or three zones

without securing any more allotment than single-zone wells. To secure the most revenue they produced the highest gravity oil and in many cases never produced from more than one zone. Therefore the added expense of the multiple-zone completion was lost. Many of the multiple-zone completions are now being converted into single-zone or combination-zone wells in order to pump them satisfactorily. In combination-zone wells located in areas where high gravity oil of the lower zone has been produced in relatively greater amounts, the oil now circulates from the upper to the lower zone even at producing well pressures.

C. N. G. A. To Discuss Electronics

At their December 6 meeting, C. N. G. A. members will hear two very interesting and illuminating talks by experts in the field of electronics. R. L. Smallman, Sales Engineer of the General Electric Company, will discuss how electronic devices work, and Howard S. Hicks of the Shell Oil Company's Catalytic Cracking Department, will describe the application of electronic devices to petroleum processing.

Today every operating man considers it necessary to have at least an elementary understanding of such devices as carburetors, magnetos, distributors, pressure gauges, thermometers, pneumatic-type instruments and controllers and their application to the equipment and processes with which he works.

The practical operating man of the future, however, will also want to add to this information at least an elementary knowledge of the theory of vacuum tubes and their application in devices which control the equipment and processes which he will operate. Such terms as grids, cathodes, resistors, and capacitors will be a part of his everyday conversation. The purpose of the December 6 C.N.G.A. meeting is to give just this type of information concerning electronics that will answer the purpose of the practical operating man.

During the war great advances were made in the fields of petroleum processing and electronics. Now that war is over and much of the secrecy regarding these advances is no longer necessary, the plant operator will want to consider the possible future applications of electronics to both his old and new processes. Radar, a development of the electronics industry, enabled our commanders to anticipate the approach of enemy planes and ships. Thus forewarned, they could take steps to minimize enemy interference with our operations.

It is not too much to expect that the electronics industry will be able to furnish the operator with instruments used to detect the approach of conditions which might disturb his processing equipment, as well as other instruments which might even prevent the disturbance.

Peacetime Industrial Program Study Begins

Designed to preserve the cooperative spirit of intra-industry unity perfected in the war effort, the Petroleum Industry War Council recently announced in Washington that 23 of the nation's leading oil executives will begin immediate study of possible ways and means to develop a peacetime industrial program.

Californians appointed to the committee included Ralph B. Lloyd, president, Western Oil and Gas Assn.; C. P. Watson, president, Oil Producers Agency of California; and W. F. Humphrey, president, Tide Water Associated Oil Co.

Walt Parker Tells One

Genial Walt Parker of General Drilling Co. is a superlative story teller as well as a practical driller of some note. At the meeting of the oil pioneers he had a new one to unfold.

According to Walt, a pilot was up in his plane doing a lot of stunting and also a lot of talking to the control tower and always winding up by saying "Rodger, Dodger." Finally a message went up to him, "Cut out that Rodger, Dodger—I'm a Major." The pilot shot back: "Rodger, Dodger, you old codger—I'm a Major, too, and I'm getting out of the service today."

Johnston Stainless Welding Rods

PROVEN QUALITY SINCE 1931

•

A. P. JOHNSTON

1845 E. 57th St. - Los Angeles 11, Calif.

THIS LAUGH

OFF!!

Jimmie: "What is the middle age, dad?"

Father: "Middle age, my son, is that period in a man's life when he'd rather not have a good time than have to get over it."

"What do you think about suicide?" asked the prosecuting attorney.

"Don't like it," said the prospective juror, "too dangerous!"

Brenda: "I know he is the man for me mother. Every time he takes me in his arms I can hear his heart pounding."

Mother: "Better be careful, daughter. When your father was courting me I was fooled for a year by his dollar watch."

A pink elephant, a greet rat and a yellow snake walked into a cocktail bar one afternoon.

The bartender looked up, glanced at his watch and said: "You're a little early boys . . . he hasn't come in yet."

"What's the difference between a co-ed and a working girl?"

"Well, what the co-ed learns from books on biology, the working girl has to get from experience."

There are three classes of women: The intellectual, the beautiful and the majority.

Voice (from passing car): "Engine trouble?"

Voice (from parked car): "Nope!"

Voice (from passing car): "Tire down?"

Voice (from parked car): "Didn't have to."

When two women become friendly, it's a sign that some third woman has lost two friends..

Definition of marriage: A mutual partnership, with the husband as the mute.

Joe Simpson, a gentleman of color, got a job on a railroad construction gang. The first day the boss seemed to pile all the hardest work on Joe. He carried heavy timbers and rails all day. That evening, all tired out, he approached the boss.

"Boss, is you sho' you got my name right on de payroll?"

"Sure, Joe Simpson, S-I-M-P-S-O-N. Right?"

"Dat's right. I thought sho' you had me down as Sampson."

The climax was nearing. I knew what was coming but I did not have the power to stop him. I was putty in his hands. Should I accede to his desires? . . . I tried to get a grip on myself. . . . I listened to his passionate appeal and I felt weak. I was but a woman alone, with no one to keep me company. . . . What should I say? . . . Could I say no to him? — the poor, sweet boy. Suppose I did do as he wished. Who would know? Harry was away. Nevertheless, I felt weak. . . .

"All right, boy," I almost whispered, "I'll subscribe for one year."

Judy: "My roommate isn't succeeding very well with her driving lessons."

Ann: "Why, what's the matter?"

Judy: "She took a turn for the worse."

Short Story: Two old maids went for a tramp.

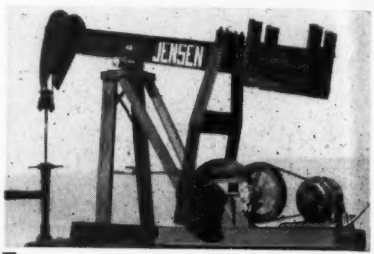
Tom: "Modern girls are like automobiles."

Abe: "How come?"

Tom: "Because a good paint job will conceal the years, but the lines will tell the real story."

Some girls reach fame and fortune in a single leap, while others get there by stepping out of bounds.

"I knew she was the taxidermist's daughter 'cause she was always stuffing some bird in the closet."



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The JENSEN Unit has something on the ball that you won't find in ordinary pumping equipment. Call it experience, engineering, or whatever you like. It all adds up to the fact that a JENSEN Unit is likely to make any California well more profitable and dependable.

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Float Shoes

★ **Floats the casing safely down the hole.**

★ **Whirls the cement *all* around the casing.**

★ **Drills out easily and safely.**

San Emidio Well Building Derrick

Western Gulf Oil Co., which is building rig for San Emidio No. 2 in sec. 35-11n-22w in the San Emidio area of Kern County, has recovered fish in San Emidio No. 1 in sec. 34 to 3043 ft. and is preparing to sidetrack. Total depth of the initial try is 3548 ft.

The K.C.L. No. 1 Los Lobos in sec. 4-10n-22w is drilling ahead in brown shale below 4925 ft.

Fruitvale Test Drilling Ahead

Northwest of Fruitvale production, General Petroleum is redrilling Calloway No. 66-17 in sec. 17-29s-27e at 7900 ft. following successful recovery of drill pipe fish.

Hooper Dunbar and Craig C. Horton, trustees of the Bell View Oil Syndicate, have moved their offices to the Consolidated Realty Bldg. at Sixth and Hill Sts., Los Angeles. Their former address was Rowan Bldg.

McCoy Advanced to Export Sales by Axelson

Selected to aid the work of C. C. McDermond as representative for the past thirteen years of Axelson Manufacturing Company of Los Angeles, in Venezuela and Colombia, Clifford T. McCoy, who has a host of friends among the home plant force of Axelson, will carry his long experience of the firm's line of pumps and sucker rods to Central America.

Clifford T. McCoy

"Mac" McCoy has had more than twenty-two years' background in the oil industry, having worked for Axelson, Oklahoma, and in the Los Angeles plant. Prior to this experience, he traveled in Canada, worked in the Rocky Mountain fields, and since departing from the Axelson fold was employed for several years with Lacy Manufacturing Company in Los Angeles.

Versed in varied applications of pumps and sucker rods, McCoy also has a thorough knowledge of hydraulics, is a machinist, who has dressed tools in the oilfields, and describes himself well as a "bottom-hole pump man". Due to his wide activities and experience, McCoy found it consistent to coin a new word to describe his efforts so far as pumps and sucker rods are concerned; he refers to that particular endeavor as "pumpology".

The team of "Mac" McDermond and "Mac" McCoy should materially assist in the selling and servicing of Axelson equipment—and promote the "Good Neighbor Policy" with our friends to the South.

Nora Grable Resumes Duties

Nora Grable, who has helped guide the destinies of the Oil Producers Agency since its inception and one of the best informed members of the Los Angeles industry, has resumed her official duties, following an illness of several weeks' duration.

Fred Hammer, veteran and popular oil man, has been giving considerable leasing attention to likely prospective areas in Kings County, particularly in the neighborhood of McFarland, LeMoore, Hanford and near the Raisin City field in Fresno County. Hammer was identified with many of the important oil discoveries made in California in the early 20's.

DOUBLE PLAY!

Many emulsions are stabilized by the presence of wax particles.

NOBS new combination chemical dehydrates oil and re-suspends wax in one operation, reducing cost of production.

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New Compact Series 150 Bowen Overshot Catches One Specific Size

SERIES 150 BOWEN OVERSHOT

Where a small, compact, single bowl overshot is desired for catching one specific size of pipe, tool joint, coupling or drill collar, the new Series 150 Bowen Releasing Overshot manufactured by S. R. Bowen Co., Huntington Beach, California, is a particularly valuable tool. The small OD of this tool—characteristic of all Bowen Overshots — enables it to be used under tight hole conditions that would normally eliminate an outside releasing fishing tool, yet it is so designed that strength of the bowl is not sacrificed for sake of small diameter.

Construction of the Series 150 follows standard Bowen design, including use of the unique helical grapple that takes a full-length, full-circumferential grip around the pipe, a grip that cinches tighter as upward pull increases, yet releases easily whenever required. A means for packing off around the fish is provided so that circulation can be established through it.

An important feature of the Bowen Overshot is that it both sets and releases on right hand rotation, thus avoiding the dangers of turning the string in an unscrewing direction. Right hand rotation of the string expands the grapples as the tool is simultaneously lowered over the fish, and simply allowing rotation to stop causes the grapple to take hold around the fish. Thereafter when upward pull is exerted the hold is secure, since the Bowen Overshot takes hold as soon as it is over the fish. Release is easily effected by simply first bumping down to break the hold and then turning the run-in string to the right to again expand the grapple, and at the same time slowly raising the string until the overshot is clear of the fish.

The Series 150 Bowen Overshot is available in a complete range of sizes in both right and left hand assemblies, and with undersize grapples and rubbers to catch and pack off tool joints or drill collars. For further information write direct to S. R. Bowen Company, Huntington Beach, California.

Ingersoll-Rand Announce New Catalog

Ingersoll-Rand Company announces the publication of a new 16-page catalog entitled, "Equipment for Chemical and Process Plants". This two color bulletin is illustrated with many installation views of the company's products as they are used in such plants. The compressor section displays machines ranging from the small, air-cooled "Type 30" to the large 3000 hp "PRE" models. Special purposes such as high pressure, refrigeration, and those requiring non-lubricated cylinders are featured. Reciprocating vacuum pumps are represented also.

Motor and Turbo Blowers, for lower pressures and large volumes of gas and air, are mentioned in their relation to the industries treated.

There are several pages of centrifugal pumps for all services in chemical and process plants, from small tank circulators, through single and multi-stage general service pumps, to the large vertical pump of 75,000 gal. per min. capacity.

Several cross sections and schematic drawings in color show the workings of ejectors, barometric condensers and the process of water-vapor refrigeration in a clear, instructive manner.

Representative diesel and gas engines for power service are pictured and the catalog is rounded out with a number of air tools and air hoists for general maintenance, construction and production.

This informative bulletin may be had on request. Write Ingersoll-Rand Co. at 11 Broadway, New York 4, N. Y., or any of its branches for Form 122.

New Parts Cleaner Speeds Fleet Maintenance

A new and really effective decarbonizer and degreasing material is announced by Kelite Products, Inc. Packaged in an open topped 5 gallon can, with or without parts basket, it simplifies fleet maintenance problems and reduces lay-up time.

This new material, Kelite Parts Cleaner, is extremely effective for the removal of grease, dyes, gums and carbon. Carbon deposits normally difficult to remove even by such methods as scraping or wire brushing are now so softened by a soak in Kelite Parts Cleaner that it can be wiped off with a cloth.

Kelite Parts Cleaner is sealed to cut down on evaporation and drag-out. It is safe on all metals. It is odorless and has no flash point—it will not burn or explode. It is an extremely versatile and safe shop material. However, as in all materials of this type, operators should wear neo-prene gloves.

The qualities of Kelite Parts Cleaner make it excellent for cleaning pistons, carburetors, fuel pumps and various small parts.

GEOLOGIST—SUBSURFACE

For Venezuela. Five years experience preferably California or foreign. Write: Atlantic Refining Co. (Room 900) Box 7258, Philadelphia 1, Pa. 11/20b

WELL GEOLOGIST

To watch progress of wells in Eastern Venezuela. Care for samples, picks casing points, core points, etc. Write: Atlantic Refining Co., (Room 900) Box 7258, Philadelphia 1, Pa. 12/5b

EXPLORATION GEOLOGIST

Work in foreign countries. Should have three years experience in mapping Rocky Mountains, California or foreign. Write Atlantic Refining Company (Room 900) Box 7258, Philadelphia 1, Pa. 12/5b

WANTED

Small Rotary Rig. Complete or Parts. 4½ or 7 x 10—Power Pump.
Rotary Table—Swivel—Kelly, etc.
1000 ft. of 2⅞ or 3½ External Flush Drill Pipe. Hydril preferred. This must be in good condition. Write to Box 45, c/o California Oil World, 117 W. 9th St., Los Angeles 15, Calif. 1/5d

In the wake of peace, D+B directs its full facilities to the manufacture of *quality* oilwell pumps, sucker rods, and pumping accessories. Quality is measured in terms of customer satisfaction. No other yardstick is so important.

Back when the tool dresser's job called for an anvil and sledge to put a new edge on a cable tool bit, D+B Pumps were recognized as a standard of quality. For the well conditions which prevailed in those times, they were built to operate at peak efficiency.

D+B Pumps of today are built to the same high standards of efficiency. As pumping conditions over the years became more difficult, D+B successfully developed better, more efficient pumps. They have the long life and superior performance that have made this product known and respected throughout the history of the oil industry.

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D+B OIL WELL PUMPS

Four Southlanders Named to Petroleum Equipment Advisory Committee By OPA

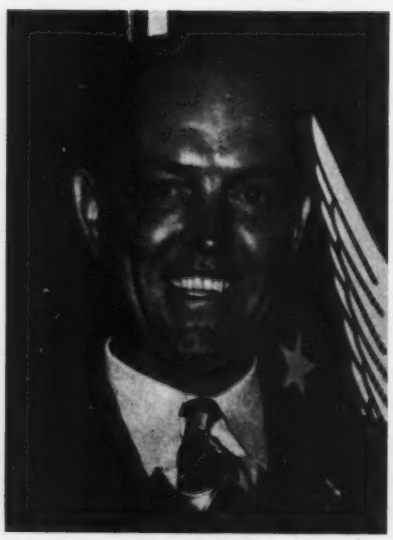
Four southern men, prominently identified with petroleum euipment industry here, have been appointed to membership in the 14 man national oilfield drilling and producing equipment industry advisory committee, it was announced from Washington OPA headquarters.

Named were Hugh H. Glen, president of Emsco Derrick & Equipment Co., Rodney S. Durkee, president of Lane-Wells Co., of Los Angeles; W. E. Sievers, vice president of Security Engineering Co. of Whittier, and T. Sutter, vice president of Baker Oil Tools, Inc., Huntington Park.

The local men will be present in the national capital December 4, when the committee's organization meeting will be held at the OPA national office.

Rodney S. Durkee

H. H. Glen



W. E. Sievers

Ted Sutter

Carrington King

(Continued from Page 40)

of the General Land Office in the Interior Department, and the Registrar of the Land Office in Los Angeles.

The first item in the correspondence, dated May 17, 1944, and titled "Memorandum to Registrar", reads as follows:

"If an application for an oil and gas lease is presented by W. W. Chapin of San Francisco or C. P. Ritter of Los Angeles, or anyone on their behalf, or on behalf of either of them, files in such case should be immediately transmitted to this office for consideration. If any application now pending in your office by the above named party will you immediately transmit giving status of land as shown by your records and calling attention to this memo. Your report should include a careful record of any previous application".

(Sig.) By Johnson
Commissioner."

A wire was sent the Los Angeles Registrar by Johnson on June 24, complaining that no reply had been received to the memorandum.

"Wire reply to reach here before 4 o'clock Eastern time if any such filing in your office, and if received and not yet mailed transmit by airmail," it stated.

Here is the reply from the Land Office:

"In compliance with your memorandum of May 17th we transmit herewith oil and gas lease application 056460 filed by C. P. Ritter, President of Consolidated Petroleum Company, describing tidelands which we believe are being used by the Navy Department. Mr. Ritter presented a letter from the Secretary of the Interior suggesting that he file an application and stating that he would get to the bottom of this matter pertaining to tideland. The application giving amended description was brought in by him a few days later. He insisted upon its acceptance . . . He requested the return of the original application but was informed it could not be returned . . . "

The Kenny-Clary statement then places the applicants for Federal oil leases as the "chief opponents" of

the pending legislation and suggests that Ritter, hoping to be the recipient of the first application to be granted, might be expected to oppose the resolution. (Ickes several times stated publicly he intended to grant the Ritter and Chapin application).

To prove their point, the Californians had reproduced in the bound booklet containing their statement a broadside circulated by Ritter denouncing the legislation and making the somewhat fantastic and extravagant claim that "$300,000,000,000 worth of oil" is behind the Congressional drive to secure title to the tidelands in the States.

Kenny and Clary discussed at some length the manner in which applicants speculate in Federal oil lease applications and charge that Ritter has made several efforts in the past year to "sell out" the application of Consolidated Petroleum Co. to "at least two large California oil companies." They further discuss the connection of Thomas G. Corcoran, famed New Deal lawyer-lobbyist, with the applicants for Federal leases, quoting a recent newspaper article which disclosed Corcoran "frankly conceded" he had given free advice to Charles McKee Wright, an attorney with space in Corcoran's office, and that "in addition had become 'deeply interested' in the controversy over tidelands."

The hearings are expected to bring out more information of this nature, with much attention focused on Ickes' "change of mind" from his adamant refusal to consider Federal applications during the first three years in office. . . Some talk is already heard of the possibility Congressional curiosity might be aroused to a point where an investigation would be held to determine the extent of speculation and attempted lease-peddling in California.

Hahn Joins Brown-Bevis

Albert P. Hahn, until recently a Lieutenant Commander in the Seabees, has joined the sales force of the Brown-Bevis Equipment Co., 4900 Santa Fe Avenue, Los Angeles. Mr. Hahn will specialize in construction equipment following the lines of both his wartime and peacetime experience

Before the war he was with Edward R. Bacon Co. in Honolulu, San Francisco, and Redding. During the war he served in Iceland on Seabee construction, and lastly for over a year as O. C. of the ACEORP (Automotive and Construction Equipment Overhaul and Repair Plant) in Guam where Seabee equipment was overhauled and rebuilt for forward moves in the Mariannas and Carolines. From July 1943 to October 1944 he was in charge of the Navy Construction and Repair Department at Vernon, Calif. This unique experience, which gave him the opportunity to observe first-hand the operating efficiency and endurance of construction equipment, will enable Mr. Hahn to work closely with his customers in applying all types of construction equipment to postwar construction jobs.

In addition to his wide field experience, Mr. Hahn has a background of engineering training, being graduated from Stanford in 1928 and is a member of the A. S. M. E.

Outstanding for industrial construction, Johns-Manville Corrugated and Flat Transite provides many design advantages for modern, streamlined buildings.

Marine Engineering and Supply Co. engineers, from long experience in using this unique material, are prepared to help you solve your building material supply problems quickly and efficiently. If you desire specific information about Corrugated and Flat Transite and its application advantages, write for FREE 80-page illustrated Bulletin.

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SAMPLE RECORD

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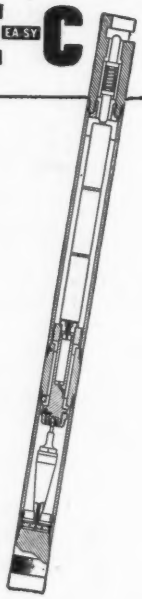

It's the most simple, most easy to operate and speediest instrument for surveying the inclination of a bore hole. The E-C Inclinometer is operated automatically by dry batteries. No timing device is needed. Permits multiple recording, requiring no development. Operating costs are lower than those of any other inclinometer.

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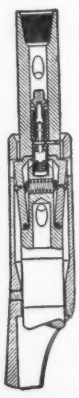
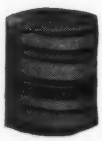


K-K Whipstock and Retrieving Sub



Polar Core Orientation

SPERRY-SUN WELL SURVEYING CO.

Offices: Philadelphia, Pa.; Houston, Corpus Christi, Marshall, Odessa, Texas; Lafayette, La.; Long Beach, Bakersfield, Calif.; Oklahoma City, Okla.; Casper, Wyo.

Facts On Japan Oil Situation

Best story of Japanese bungling to come out of the war appeared Oct. 30, in the monthly house-organ of Standard Oil Co. (N.J.)

Jersey Company researchists — with the cooperation of the War Department and the Foreign Economic Administration—disclosed that, even without the atom bomb and Russia's entrance into the war, the Japanese Empire could not have held out more than two weeks after official VJ-Day for lack of oil.

Here are a few facts on Japan's horrifying oil shortage:

In 1942, 300,000 barrels of vegetable oils were thrown in to current oil stocks, along with more than 1,000,000 barrels of alcohol and considerable "reclaimed oils from crankcase drainings" . . . At the end of 1944 "pine-root oil" was being hydrogenated into so-called aviation gasoline and the "home islands rang" with the slogan "200 pine roots will keep a plane in the air for one hour." By this time, training planes were being flown on alcohol.

With the loss of "outer-zone" production, Japan is believed to have revived its home output to an annual rate of 2,250,000 barrels. Consumption of liquid fuels for the first six months of this year was 11,107,000 barrels, with fuel oil and Diesel oil significantly dominating the picture for 4,600,000 barrels of the total.

No self-respecting American oil company would stoop to mention the production of "seven small fields with deep wells in Formosa" which Japan meticulously recorded as producing 37,000 barrels a year. The fantastic Nip battle for sufficient oil supplies is further recorded in the survey to the point where savage Allied submarine and air attacks on Japanese shipping reduced oil-carrying shipping to "junks, sampans, luggers, barges and an occasional tanker" and—later—to mission reports stating "a barge was the only shipping sighted in Camranh Bay" or "French Indo-China ports were empty on May 16."